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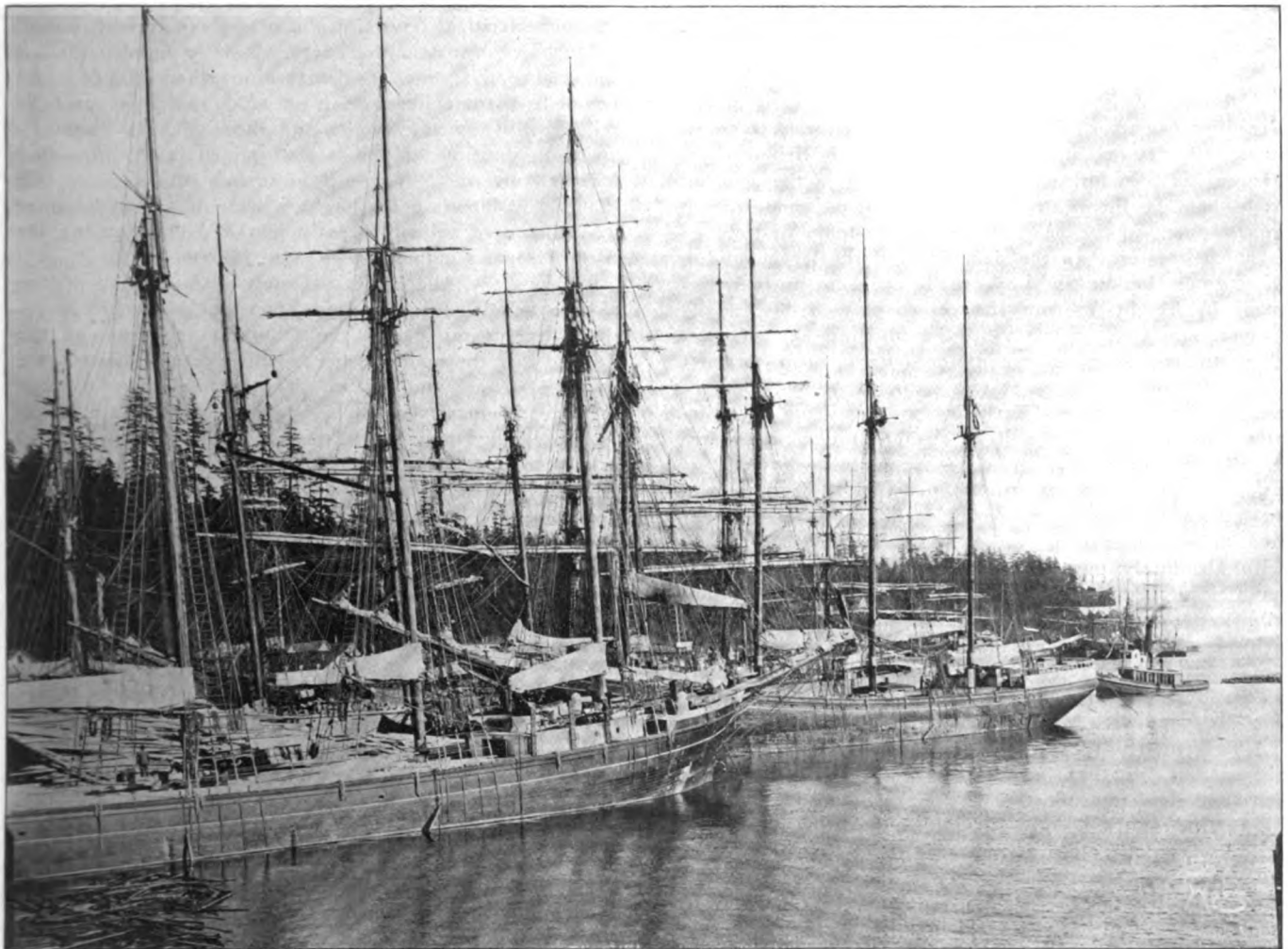
CLEVELAND, AUGUST 17, 1905.

No. 7.

AN OBJECT LESSON ON PUGET SOUND

The people of the Pacific coast are now being treated to a very impressive object lesson illustrative of the

plying lumber at Panama for use in the preliminary work of constructing the Panama canal have been chartering foreign sailing vessels, chiefly bounty earners of



FOREIGN LUMBER SCHOONERS AT PORT BLAKELY, WASH., LOADING LUMBER FOR PANAMA.

short sightedness of the United States in refusing to promote by suitable legislation the development of the American merchant marine. J. J. Moore & Co. of San Francisco, who were awarded the last contract for sup-

plying lumber at Panama for use in the preliminary work of constructing the Panama canal have been chartering foreign sailing vessels, chiefly bounty earners of

to the upbuilding of the commerce of other countries, while at the same time indirectly accepting the benefits of the merchant marine bounties paid by other governments.

The charters secured by J. J. Moore & Co. for this business have been secured at rates ranging about \$9.25 per M feet, while American vessels are offering for the service at \$10.50, the difference being barely sufficient to cover the additional expense of operating vessels under the more exacting rules and higher wages paid on those sailing under the American flag. An effort was made by the ship owners of the Pacific coast to induce the canal commission to rule that this business must be carried in American bottoms under the provisions of the general act that government business must be carried in American ships, but the commission got around this provision by contracting for the lumber at a flat rate laid down at the isthmus, permitting the contractor to make his own arrangements for transporting it there. The accompanying engraving is from a photograph of a group of foreign lumber schooners loading lumber at Port Blakely, Washington, an American port, for shipment to a quasi-American port on the isthmus, under a government contract and for government use. At Eagle Harbor, another port not fifteen miles away, half a dozen American sailing vessels are laid up waiting charters, some of which submitted bids on this business.

LIVERPOOL SHIPPING LETTER

Liverpool, Aug. 7.—Mr. Arthur Caird, president of the Greenock Chamber of Commerce, who is entitled to speak as an authority on shipping trade prospects in Britain says: "There has been little, if any, improvement in the shipping trade, nor is there anything to justify the hope of an improvement in the near future. The supply of tonnage is much greater than the demand, and the large number of steamers building will effectually prevent any improvement in freights. From the returns issued by Lloyds Register on Dec. 31 last year, the total amount of merchant tonnage then under construction was 1,049,860 gross tons. On June 30, 1905, it was 1,301,457, showing an increase of 251,597 tons. Early in 1905, for some unexplicable reason, there was quite a rush to order new ships, and a large number of tramp steamers were ordered at prices ranging from \$27 to \$30 per ton of dead weight. In fact, a few steamers were closed as low as \$26 per ton. The sailing ship market has been very depressed, with absolutely unremunerative freights. Many owners have either laid up their ships or sold them at exceptionally low prices. Norwegian shipowners have been the principal buyers, and as their banks have been heavily drawn upon to make those purchases, there are not likely to be any more sales in that direction for some time to come."

I have to hand reports of Scottish shipbuilding, which shows that July has been rather a disappointing month in the shipbuilding industry. Nevertheless trade continues fairly brisk at the different centers, but as the months go past, it becomes more and more evident that the recent rush to place tonnage in prospect of brighter freights is not being justified by events as they are turning out. Freights continue at figures which allow of only the barest profit, a circumstance which has for the moment caused a pronounced lull in the ordering of new vessels. Some shipowners with vessels in the building are said to be so disgusted with freights as they stand that they have even made a request to the builders to delay the work on their craft. Considering that July is the great holiday month among the Scotch shipyards, the launching of sixteen

vessels of 22,124 tons is quite satisfactory. These totals make the figures for the seven months 176 vessels of 281,084 tons, an amount that has only been exceeded for the same period on three occasions—in 1900 and two subsequent years. In July of 1904 33,379 tons were launched, but these figures included the Cunarder Caronia, without which the amount would have been only 12,879 tons. In comparing the totals for the seven months with the same period of 1904, it will be found that while this year six vessels fewer have been launched, the tonnage has made an advance of 46,472 tons. There is still considerable activity in the steel trade. The 480 vessels now building do not constitute a record by any means, but as work actually in hand it is most satisfactory.

I learn that a well known London firm of shipowners, extensively interested in the western trade, has just placed orders with northeast coast firms for ten new steamers of 6,000 tons each, and of good specification. Of these it is reported that four are to be built by Messrs. J. L. Thompson & Sons, two by Messrs. Short Bros., and two by Messrs. W. Pickergill & Sons, all of Sunderland, while the remaining two have been placed with Messrs. J. Readhead & Sons, of South Shields. The vessels are due for delivery between April next and the end of 1906, and are said to be intended to run in conjunction with the Buenos Ayres & Pacific railway between the River Plate and Europe.

The Allan line is said to be in no way disturbed by the somewhat critical report of a German expert with regard to turbines on Atlantic liners. It is pointed out that the main advantage of the turbine when properly developed, is some increase in speed, a saving of space, a reduction in general weight, and above all, the disappearance of vibration. Much is also gained in the obviation of smell and dirt. There is a further advantage in this that the turbine is never likely to have any breakdown, as in the case of a liner recently in the Atlantic, when the cost of repairs amounted to some \$60,000.

Apocryphal the Allan line, although no intimation of any change has been received in Liverpool as yet, it is authoritatively stated that the Dominion government has decided that the mail steamers shall in future take a route south of Newfoundland in place of the short passage through the Straits of Belle Isle, and land their mails at North Sydney instead of Rimouski. The reason for this is said to be that the recent test in connection with the Allan liner Virginian as to the advantage of the proposed new route proved sufficiently satisfactory to warrant its adoption. It is also claimed that under this arrangement the maritime provinces will get their mail two days earlier than heretofore, and Montreal one day earlier. It is doubtful, however, whether this arrangement will be continued throughout the winter, as when the steamers proceed to Halifax they will reach that port almost as quickly as they can North Sydney, whilst in the matter of delay through ice Halifax has the advantage.

The news comes from Quebec that a new line of steamers between that port and Liverpool is to be established under the auspices of the Quebec Transportation Co. Here, in Liverpool, nothing is known of the affair, and upon inquiry at the offices of the several lines engaged in the St. Lawrence trade, it is impossible to obtain confirmation or otherwise. Quebec is served from Liverpool by the Allan, Dominion, and Canadian Pacific railway services for Montreal, calling at Quebec with cargo and passengers, each having a weekly sailing. In addition to these there is the Moss line, with a monthly steamer direct to Quebec only. Each of these lines accepts cargo from Quebec to Liverpool, the Moss line loading only at Quebec. There is also the Manchester Liners, Ltd., between

Manchester and Quebec and Montreal, etc., and vice versa. Seeing that these liners have for the past season or two been unable to obtain all the cargo they required, and that, in some instances, sailings have been reduced on account of scarcity of cargo, it seems as if there was absolutely no room for a new line to carry existing traffic, unless the new line is going to break new ground in some other way.

The shipping world is keenly interested in the efforts of the Allan line to work up a business connection between Canada and France. Up to the present time the results have been quite satisfactory, and trade continues to grow. A new feature of the trade recently is that of shipments of Canadian cattle to Havre. Only last week a consignment of 130 was shipped from Montreal on board the liner *Sardinian*, and it is reported that consignments will be brought over in the subsequent sailings. Canadian exporters are said here to be jealously watching the trade, in which they see great possibilities. At present the business may be of small dimensions, but there is no saying what a few years may bring forth.

The fitting of the Cunard mail steamer *Lucania* with an apparatus enabling her to receive signals dispatched from a submarine sounding body has attracted considerable attention on this side of the Atlantic. The system aims at providing vessels with additional means of ascertaining their position when approaching land in thick or dark weather. A Cunard liner on her westward voyage makes Nantucket lightship, which is some 218 miles distant from New York. This latter portion of the voyage lies principally through shoal water, and to assist navigators there are, in addition to the Nantucket lightship, similar vessels at Fire Island and Sandy Hook. The utility of these craft has recently been increased by the provision of a submarine bell or gong, sounded, of course, from the lightship. When the bell is struck, the sound waves are propagated in regular spheres traveling outwards through the water and may be picked up by any vessel fitted with the special sound-receiving apparatus. This is attached to the inside of the ship's hull below the water line, and is connected by a telephone with the captain's room. Thus a ship navigating the shoals of New York bay picks up a signal from a lightship, and the automatic indicator in the chart room at once directs the attention of the navigator to the fact, and he knows by the number of signals the lightship from which the signal came. He is thus able to determine the position of the lightship, and direct his ship accordingly. Recently, when making New York in rather thick weather, a Cunard steamer picked up the signals from each of the three lightships named, and that at distances ranging from two and a half to four miles, and the captain was thus enabled to accurately check the position of his vessel. The signaling apparatus is extremely simple, and it has the additional advantage of delivering its welcome messages automatically. It is safe to prophesy a successful future for this ingenious and reliable method of submarine signaling.

The Liverpool Underwriters' association report that the casualties to vessels of 500 tons gross register and upwards which have been posted in the loss book during the month of July number 313, against 315 in July last year, 357 in July 1903 and 327 in the same month of 1902. Of this number thirteen were total losses representing 26,314 tons, against seventeen vessels of 28,212 tons in July last year. The partial losses numbered 300, 145 being British, and 155 foreign. The nature of casualty was strandings, 100; collisions, 100; damage to machinery, etc., 45; weather damage, 31; fires and explosions, 23; missing, 1, and other casualties, 13.

BRITISH NAVAL ARCHITECTS IN CONFERENCE

The Earl of Glasgow presided at the summer meeting of the British Institution of Naval Architects which opened in London on Wednesday, July 19. The first paper was read by Admiral Sir Cyprian Bridge on "Naval Strategy at the Time of Trafalgar." The admiral said the time of Trafalgar was full of instructive episodes when regarded from the point of view of tactics. Even with the most recent experience of naval warfare, they could still regard Nelson as the greatest of tacticians. History, he said, recorded no decisive naval victory in which the victorious fleet had not succeeded in concentrating against a relatively weak point in its enemy's formation a greater number of its own ships. This rule certainly prevailed at Port Arthur in the battle of June 10 last, although it was not so overwhelmingly decisive as some others. They did not know enough of the recent fight in the Straits of Tsushima to be able to describe it in detail, but they did know that at least some of the Russian ships were defeated or destroyed by a combination of Japanese ships against them. Looking back at the tactics in the time of Trafalgar, they saw that the history of them confirmed the experience of earlier wars, that victory did not necessarily fall to the side which had the biggest ships.

A further paper on "The Ships of the Royal Navy as They Existed at the Time of Trafalgar" was read by Sir Philip Watts, director of naval construction. In this Sir Philip gave a number of tables, enumerating and classifying the various ships then forming the navy, and described the designs, construction and armament, etc., of some of the more important of the line of battle ships and frigates.

In the discussion which followed the reading of these two papers, all the experts who spoke, including Admiral Sir Nathaniel Bowden-Smith, Admiral Sir Edmund Freemantle, Captain Bacon, R. N., Lord Brassey, Sir William White, and Admiral Sir John Hay put high values on speed as one of the greatest advantages which a man of war could possess. Admiral Bowden-Smith emphasized this point by saying that the Japanese had a great superiority over the Russians, partly because the speed at Admiral Togo's command enabled him to put his ships where he liked, and do what he liked, culminating in a victory in some thirty-seven minutes after the first shot was fired by the Japanese. It was a matter of great importance that it should be decided whether speed was one of the great factors or not in a warship.

CLASSIFICATION OF MERCHANT SHIPPING.

The next paper read was by Mr. H. J. Cornish, chief ship surveyor to Lloyds Register, on "The Classification of Merchant Shipping," illustrated by a short history of Lloyds Register. In the course of his paper Mr. Cornish said it was not until the early part of the eighteenth century that a systematic record of vessels was organized, which appeared to be the forerunner of all modern registries of shipping. It was at that period the habit of those interested in shipping to congregate at a coffee house, kept by one Edward Lloyd, situate in Lombard street, London, to discuss their shipping affairs, and this meeting place gradually developed into the headquarters of maritime business, and especially of marine insurance. Edward Lloyd, being a capable and energetic man, made his house a center of marine intelligence, which has since developed into the world famous corporation of Lloyds. There, whether on the initiative of the proprietor or the frequenters, were started certain records of shipping termed "Ships' Lists," which contained an

account of vessels which the underwriters who met at the house were likely to have offered to them for insurance. Probably for a considerable time these lists were in manuscript and were passed from hand to hand, but about 1726 they seem to have been put into type and circulated in the form of a printed register. After describing Lloyds Register as the lineal descendant of the Green Book founded in 1760 and the Red Book founded in 1790, Mr. Cornish went on to observe that next to Lloyds Register in print of antiquity comes the Bureau Veritos of Paris, founded in 1828, the Norske Veritos of Christiania was founded in 1864, the Germanischer Lloyd of Berlin in 1867, the Record of American and Foreign Shipping of New York in the same year, the Registro Italiano of Rome in 1870, the Veritos Austro Ungarico in 1858, and the British Corporation for the Survey and Registry of Shipping, with its headquarters at Glasgow in 1890. In addition may be mentioned the Liverpool Underwriters Registry for iron vessels which was established in 1862, and amalgamated with Lloyds Registry in 1885. In all the developments that have taken place in Lloyds Register, the original equal representation of merchants, shipowners and underwriters have so far as possible been maintained. The general committee of Lloyds Register may, therefore, be fairly described as a merchant shipping council, broadly representative of the whole country, and of the main interests of the shipping community of the world. One of the most important developments in connection with the constitution of Lloyds Register has been the formation of a technical committee consisting of fourteen elected representatives of shipbuilders, engineers and steel makers. The cooperation of this technical committee, on which sit some of the most prominent men in their professions, has proved of the greatest value to the committee and also to the staff of Lloyds Register. The aim of the men who founded Lloyds Register was to provide a classification which should be a correct indication of the real and intrinsic quality of individual ships. That aim to this day was always kept clearly in view, and the committee might justly claim that their rules by focussing the best practice and knowledge of the time, have had an immense and beneficial influence on the development of shipbuilding, not only in Britain but throughout the world. Touching on the question of machinery, Mr. Cornish said in 1834 the committee was satisfied to receive twice a year a report that the engines and boilers of a steamer were efficient from a competent master engineer. By 1874, however, the number of steam vessels had increased so largely that the committee felt they would no longer be justified in classing them without taking steps to assure themselves with the same certainty as in the case of the hulls of vessels that the whole of the details of the machinery were in thoroughly safe condition. Accordingly a staff of engineer surveyors was appointed, and the committee were soon in a position to formulate rules for the strength of boilers, which immediately secured general confidence. Dealing with the special survey branch of the work, he said it might be interesting to note that at the present time nine turbine steamers of 102,000 tons gross, including the two Cunarders building under agreement with the British government, channel steamers, etc., are being constructed under the society's special survey. Mr. Cornish then went on to deal with the size and type of vessels. He said when the rules of Lloyds Register were drawn up in 1834, a vessel of 500 tons was considered large. Of 750 vessels built in the United Kingdom in 1830, only ten were above that tonnage. Of 19,110 vessels then belonging to the United Kingdom, 110 were

between 500 and 800 tons, 15 were between 800 and 1,200 tons, and 43 were of 12,000 tons and upwards. At the present day, according to the latest published official figures, of 10,330 sailing vessels registered in the United Kingdom, 76 are between 500 and 800 tons net, 136 are between 800 and 1,200 tons, and 624 are of 1,200 tons and upwards. Of the 10,122 steamers registered, 1,924 are between 500 and 2,000 tons gross, 1,969 are between 2,000 and 4,000 tons, 764 are between 4,000 and 8,000 tons, and 84 are of 8,000 tons and upwards. Not only is it the steady increase in the size of vessel that has demanded alertness on the part of the society's officers, to move with the times, but also the changing of fashion as regards types from having at first flush weather decks, iron steamers were soon after provided with protections around their machinery openings, then poops and fore-castles followed, poops were lengthened and joined to bridge houses, raised quarter decks succeeded long poops, forming when associated with the short bridge and fore-castle, the familiar well-decker, and these were followed by awning-decks and raised fore decks. At the present time "shelter-deck" and "spar-deck" vessels are the types most commonly adopted, but there are also the "turret" and "trunk deck" types, for classification of which the society's rules duly provide. After touching upon the adoption of tables of freeboard in 1882 suitable for every type of vessel on the basis of maintaining such a proportion of the total volume of the main structure of vessels out of water as reserve buoyancy, Mr. Cornish summarized the labors of the society's surveyors in a way that cannot fail to impress one with the exhaustive system of inspection which is carried out. During the year 1904 he said Lloyds classed 617 new vessels of 1,157,224 tons gross, tested 699,357 tons of steel, 7,483 anchors, and 307,572 fathoms of cable, and assigned 445 freeboards under the Merchant Shipping Act. In the ten years which ended Dec. 31 last, it classed 5,980 vessels of 11,294,680 tons, and since statutory authority was given to it has assigned 12,919 freeboards. When it is remembered that 9,744 vessels of 18,250,013 tons gross now hold the classification of Lloyds Register, and that these are subject to periodical survey, it will be recognized what an amount of work is done by the society's surveyors, and what an important part they play in the up-keep of the merchant marine. To carry out these multifarious duties, the society has a staff of 299 surveyors stationed at every building and repairing port of importance throughout the world. To bring the results of all this surveying work conveniently together for the use of the shipping community is the primary purpose of Lloyds Register book. Its secondary purpose is to serve as a record of all the mercantile shipping of the world, whether classed with Lloyds register or not. Mr. Cornish concluded by saying that the rise and progress of the classification of shipping as illustrated by the development of Lloyds Register, would show to those not fully conversant with the subject, the security it afforded to merchants, shipowners, and underwriters, and not least, the assistance it is capable of giving to shipbuilders and engineers by bringing together the results of experience and investigation from all quarters.

INFLUENCE OF DEPTH OF WATER ON SPEED.

Another interesting paper on the above subject was contributed by Mr. Harold Jarrow, the treatment of the subject having special reference to destroyers recently built. He stated that about three years ago the British admiralty placed orders with several firms for destroyers of a new type, having heavier scantlings than had been

previously adopted. These vessels were termed destroyers of the "river class," being named after various rivers in Great Britain. Their displacement on trial varied from 550 to 600 tons, and the stipulated speed was $25\frac{1}{2}$ knots. Calculation based on previous trials of destroyers led to the belief that there would be no difficulty in obtaining this speed with 7,000 H. P. When the trials commenced, however, there seemed little prospect of the speed being realized with the horse power contemplated. Progressive trials were made over the Maplin measured mile with the destroyer *Usk*, and when the speed approached that guaranteed, a very small advance of speed was obtained for a considerable increase of power. Other contractors experienced similar difficulties, except those who ran their trials on the Skelmorlie mile, where there is a depth of water of about 40 fathoms, this being far in excess of what was available on the Thames or on the east coast. As all the boats were nearly identical, the conclusion arrived at was that the variation in results was due to the difference of depth of water in which the trials were run.

Having failed to get their speed on the Maplin measured miles at the mouth of the Thames, Messrs. Jarrow & Co. erected mile-posts on the cliffs near Dover, off which they successfully ran their first four destroyers of the "river class." Although the depth available there was not the most suitable, it was better than that of the Maplins (where there is a depth of 50 feet at low water), and the vessels were able, after the measured mile runs had been made, to get into deep water outside the Goodwin sands quickly, thus the greater part of each trial was made under favorable conditions as regards depth. The east coast firms were in the same difficulty, and after a long series of trials they added to the height of their mile posts, so that they might be seen further from the shore, where deeper water enabled them to get through their trials. He believed they found that with a depth of water of 100 feet or less the guaranteed speed could not be obtained, but when the depth was 120 feet or more, the speed could be realized. These results showed clearly the importance of depth, and the conclusion his firm also came to was that a depth of at least 120 feet was desirable to get the guaranteed speed. As such a depth of water was not available on the Thames, his father determined to make further investigations, both by tank experiments and by actual trials with destroyers themselves. There being no tank in this country available for such experiments to be carried out for private firms, the North German Lloyd were asked to make them in their tank at Bremerhaven. They were furnished with the exact lines of the destroyers, and were asked to test the resistance of the vessel at a displacement of 600 tons, and also 450 tons, at a depth of 20 feet and upwards. He submitted the results thus obtained of speed and effective horse power for depths of 20, 30, 45, 60, and 90 feet for the 600-ton displacement. Ninety feet was the greatest continuous depth available at the mouth of the Thames, and the main object of these experiments was to ascertain whether it would be possible to obtain as good, or nearly as good, a result on the Thames as elsewhere. It would be seen that the most noticeable feature in each curve was a distinct hump at which the rise of speed was very small in comparison with the increase of power. This was confirmed by a progressive trial made by his firm with a destroyer of 400 tons, in a depth of 40 feet, and when the steam pressure was increased from 100 lb. to 125 lb. there was only half a knot rise of speed, but when the pressure was increased from 125 lb. to 150 lb., a rise of five knots was obtained. There was no doubt that the difficulty at first experienced with the

trials of the river type of destroyers was due to the depths of water where the trials were made being such that the hump came at a critical point for the speed required and that when the boats were run in deeper water the hump had not made itself appreciably felt, though it would have done so at higher speeds. From the results of the experiments described in the paper it followed that, in selecting a course for a trial, the main point was not necessarily to get deep water, if unfortunately deep water was not obtainable, but to aim at a depth in which the position of the hump was well clear at the required speed. It should be noted that the inclination of the vessel taken in conjunction with the revolutions gave a very fair estimate of the depth of water, for depths varying from 20 ft. to 100 ft., and this might possibly be turned to useful account for navigating purposes. For example, if the destroyer be running at about 19 knots, and the officer in charge did not desire to go nearer the shore than 24 ft. depth, immediately the inclination rose to $4\frac{1}{2}$ in. in 20 ft., he knew that his limit was being approached. To carry out this method of arriving at the depth successively, proper data of the characteristics of each vessel must necessarily in the first place be obtained. Assuming that was done for vessels such as torpedo boats or destroyers, the depth of water under the boat could at any time be approximately arrived at. From the foregoing experiments the importance of a reliable measured mile would be clearly seen, and, as there was a depth of 180 feet within a short distance of the Goodwin sands, he respectfully submitted that it would be of considerable value if a measured mile were fixed at this spot, as it would enable the admiralty to obtain reliable results for vessels from Chatham, Sheerness and Portsmouth, and also for vessels constructed on the Thames.

Sir William White contributed to the discussion which followed. He said the broad general conclusions deducible from these trials absolutely agree with those obtained from the experiments previously made by Captain Rasmussen, Colonel Rota, Oberster-Ingenieur Popper and others. The curious humps and changes of curvature occurring in the curves of resistance and horse power when certain speeds are reached in certain depths of water are well known features, and mark conditions to be avoided in steam trials. But the sale and extent of the trials and the ranges of speed covered go far beyond what has hitherto been available. He noted with great regret that Messrs. Jarrow had to go to Germany for the model experiments, and he trusted that this fact might furnish fresh incentive towards the establishment of a research tank at the national physical laboratory. He heartily indorsed the recommendation of a deep water measured mile near the Thames.

THURSDAY'S MEETING.

The morning session on Thursday was devoted to the consideration of two addresses, one by the vice president, Mr. J. T. Milton, on "The Failure of Some Large Boiler Plates," and the other by Mr. William Gray, on "A Comparison of the Performances of Turbines and Reciprocating Engines in the Midland Railway Co.'s Steamers." Mr. Gray in his address dwelt in detail on the performances of the Midland Railway Co.'s steamers, and said that speaking generally the performances of the turbine steamers, especially the *Manxman*, had been greatly superior to those of steamers fitted with reciprocating engines. There could be no doubt that one great benefit was the elimination of the vibration inseparable from reciprocating engines. The engines were most carefully balanced, vibration was almost imperceptible, and the vessels were steadier.



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The United States has grown great industrially because as a nation it has moved as a unit to upbuild its industries. However small the individual industry may have been, it has received the concerted aid of eighty millions of people. We have but to look about us to see signs of prosperity upon every hand. There are more individual homes in the United States than in any other land. While it is true that under its fiscal policy a few persons have accumulated enormous fortunes, it is likewise true that millions have acquired a competence and that everyone is in comfort. By a single omission only one industry has been excepted from the beneficence of this policy. That industry is shipping. In the early days of the republic shipping was protected and it accordingly flourished. The fleet of the United States was the premier fleet of the world and its great clipper ships were known in every port. Several years after steam became the common mode of ship propulsion, the United States still retained its ascendancy; but protection was then withdrawn from the ship while it was extended to every other branch of industry. The decline of American shipping was inevitable. From the proud

state in which it carried 90 percent of her commerce, it now carries less than nine.

We are apt to point to the railroads as the great developing agencies of the country and so they have been. Railroad transportation in the United States is a wonderful science; railroad construction in the United States has surmounted engineering obstacles of the most formidable character. But would the railroads have achieved their present distinguished place had it not been for the support extended to them by the general government? Are not the enormous grants of land to the railroads in the nature of subsidies? Every business man knows what a blessing it is to have a fixed income which cannot be materially disturbed by the vicissitudes of business. Such an income have the railroads in the postal subsidies. During the past seven years the government of the United States has appropriated \$238,776 for railway mail carriage and that without subjecting the railroads to the necessity of expending a single penny for railway car equipment, for the government has built the mail cars during the past seven years at a cost of over \$33,000,000. What a contrast to these enormous figures is the pitiful sum of \$998,000 which was earned by American steamers last year for American ocean mail carriage. An examination of the government's finances shows that it spends money pretty generously in every department. It has pledged itself to spend hundreds of millions to dig a ditch across the isthmus of Panama notwithstanding the fact that for the past five years not a single ship has been built in an American shipyard that could avail itself of over-sea trade to be obtained by use of that canal. When that canal is finished only foreign ships will use it as a highroad to the orient. Is it not strangely inconsistent conduct to dig deep channels for ships without first providing an economic condition under which ships may flourish?

There are abundant illustrations to be obtained of the advantages of protection to shipping. On the great lakes there has been built within the past year or is under contract to be built a fleet of ships that can in a single season move 7,400,000 tons of ore. These are an addition to a fleet that if given ordinary dispatch could move 35,000,000 tons of ore in a single season. These ships would not be built were it not for the beneficent policy which has reserved the trade of the great lakes to American ships and for a wise expenditure of money which has caused channels to be deepened so that the greatest ships may take advantage of them.

The great bulk of business over the Panama railroad is foreign, the total amount for 1903-4 being 211,000 tons, while the purely American freight was only 70,000 tons. The earnings were \$1,500,000, of which only \$360,000 came from the American business. Under federal law no foreign vessels may carry American freight between American ports, but the foreign business, which is far more important, may be handled by foreign vessels.

AROUND THE GREAT LAKES

Capt. C. T. Cunderson is in command of the new steamer George H. Russel.

Coal dock sites at Milwaukee and Superior have been purchased by the Philadelphia & Reading Coal Co.

Capt. Robert Tringle has been appointed master of the package freight steamer Conestoga of the Green Bay Line.

The Toledo & Ohio Central docks at Toledo are to be equipped with Brown Hoist electric unloading apparatus with a capacity for unloading 600 tons an hour.

The steamer Frank J. Hecker, building at the St. Clair yard of the Great Lakes Engineering Works, for Mr. J. C. Gilchrist of Cleveland, will be launched Sept. 2.

The International Waterways Commission, consisting of Messrs. Mabee, Coste and Clinton, are investigating the alleged diversion of water from the Canadian to the American side of the Sault.

A special from Detroit says that the Dunbar & Sullivan Co. have placed a contract with the Great Lakes Engineering Works for a derrick scow to cost \$40,000, to be built at the St. Clair yard of the company.

No special effort was made to establish an unloading record on the second trip of the Hoover & Mason. The unloading apparatus at the South Chicago docks was not in readiness to obtain maximum dispatch.

The cylinder of the engine of the steamer Erin burst last week while in the Detroit river and the escaping steam scalded to death the second engineer Matthew Caldwell. The Erin is owned by James Conlon, Thorold, Ont.

The present year has been an unusually good one in the steamship passenger business. It is reported that the Richelieu & Ontario Navigation Co., of Montreal, has earned \$75,000 more than during the corresponding period last year.

C. H. Nicholson, general traffic manager of the Northern Navigation Co., is authority for the statement that his company will soon place an order for a new passenger steamer on the route between Toledo, Detroit, The Sault and Georgian Bay ports.

Dredging for a third slip at the Ecorse yard of the Great Lakes Engineering Works has been started. The cut will be 1,000 ft. long, 180 ft. wide and 16 ft. deep. The slip will be used for the storage of new boats, fitting out and for vessels undergoing repairs.

The Great Lakes Engineering works, Detroit, Mich., has broken ground for the new boiler shop which will be operated in connection with the new drydock. The boiler shop which will be of steel construction will cover an area of 210 ft. by 135 ft. and will be divided into three sections.

W. H. Waggoner, for many years connected with Hart's steamboat line, has organized a company of which he will be manager to be known as the Waggoner-Roulett Steamboat line, to operate a freight and passenger service in Green Bay. The offices of the company will be located at Green Bay.

The D. & C. Navigation Co. has chartered the propellers Winnipeg, Eber Ward and Conestoga to bring deck loads of package freight from Cleveland to Detroit, owing to the heavy freight trade and the double shifting regular boats are now making to remain in port long enough to secure full cargoes.

The package freight steamer Badger State is to be converted into a lumber hooker. She was built in Buffalo in 1862, and was considered at the time one of the finest passenger steamers on the lakes. Her career since has been varied, passing into several hands until two years ago she was sold for a song at marshal sale to H. R. Havey, of Detroit.

A dividend of six percent has been declared by the Manitowoc Dry Dock Co., Manitowoc, Wis., upon its capital stock of \$150,000. The following officers were re-elected: President,

Elias Gunnell; vice president, Thomas Prindiville; general manager, Charles C. West; secretary and treasurer, L. E. Geer. The treasurer's report shows that the year has been distinctly favorable.

The Chicago & Great Lakes Dredging & Dock Co. is building the superstructure for the new lighthouse on Racine reef and the furnishing of practically a new harbor at Saugatuck, Mich. At Saugatuck the dredges will move the mouth of the Grand river 1,400 feet further north for the purpose of eradicating a troublesome bend in the river.

A ferry boat at South Haven collided with the steamer Eastland on Saturday last, and while the Eastland was in no way damaged nearly all the occupants of the ferry boat were thrown into the water. The accident occurred near the pier and everyone was saved by the prompt action of several men on the pier, who jumped into the water after the passengers.

The government work in modernizing the harbors of the east shore of Lake Michigan is proceeding rapidly, and when it is completed all the important harbors from St. Joseph north to the Manitous will be in shape to care for the largest ships now in general service. The channel leading into the harbor of Muskegon will be widened to 300 ft.

Following the lead of a number of other big wholesale houses which have established lightering lines on the river, Marshall Field & Co. have secured the steam canal-boat M. Talcott to transfer its freight to warehouses and freight depots. There is now a list of a dozen lighters on the river carrying merchandise of all kinds that was formerly handled by teams from the streets.

Judge Swan of Detroit, has confirmed the report of United States Commissioner Davison in the libel action brought by the Lehigh Valley Transportation Co., owner of the steamer Oceanica, against the steamer Chisholm in the fall of 1896, as the result of a collision between the two boats in Lake St. Clair. Davison found for the Chisholm in the sum of \$40,000. An appeal is now likely.

All four steamers now under way at the Ecorse yard of the Great Lakes Engineering Works for 1906 delivery, that is, the two Jones & Laughlin boats, the W. P. Snyder boat and the Tomlinson boat, will be built after the design of the Tomlinson steamer James E. Davidson, with straight cargo hoppers. The design of the Jones & Laughlin boats was held in abeyance until the Hoover and Mason design was tested, but it has now been decided to build them all alike.

The newspapers had it last week that an experiment that would be watched with interest by vessel owners on the great lakes was that of fitting the steamer Wm. E. Corey with cement floors and that not a wooden floor would be laid in the ship. It is now three years since wooden floors were laid on freighters. However, there is a departure in the case of the Corey in that the floor which is laid on the top of the steel deck is of asbestos cement manufactured by F. Hickox, 29 Deshler building, Columbus, O.

PERSONAL

Mr. R. S. Cooper, formerly the Pittsburg representative of the Rand Drill Co., has been appointed manager of the New York office of the Independent Pneumatic Tool Co., with offices at 170 Broadway.

Mr. Charles Parsons, of Chicago, who is well known in the pneumatic tool business, is now associated with the Independent Pneumatic Tool Co., First National Bank building, Chicago, and will travel out of Chicago for this company.

THE LARGEST LOG RAFT

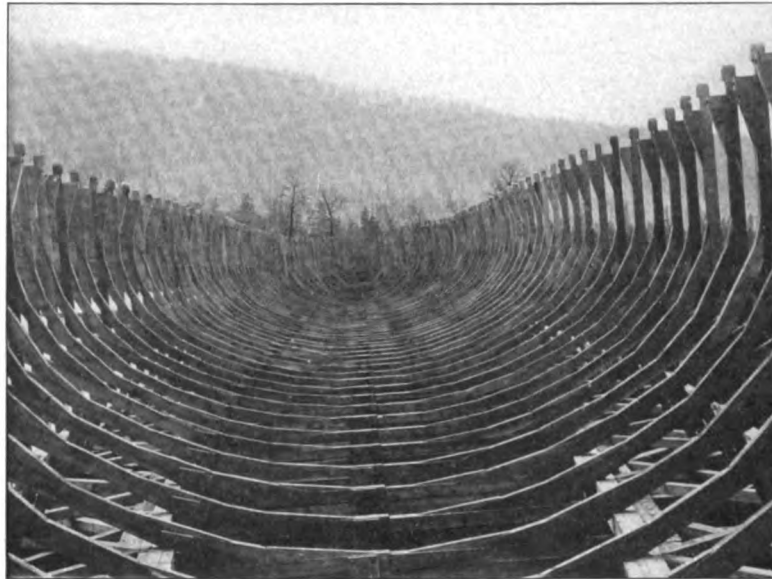
Stella, Wash., Aug. 10.—(Special Correspondence.)—The announcement that the largest log raft yet constructed anywhere in the world will be built on the Columbia river and towed to San Francisco and thence to Shanghai, China, has served to arouse no small degree of interest in maritime circles on the Pacific coast and incidentally has resulted in a renewal of the opposition to these large

ocean-going rafts which has all along been manifested by many ship owners and vessel masters. The shipping men who look upon the rafts as positive menaces to navigation and who contend that they should be prohibited from going to sea are rather exercised regarding the prospective enterprise, not so much because of the unusual size of the proposed raft as by reason of the fact that this will be the first attempt to tow one of the giant rafts across the ocean, and if successful, will doubtless result in a regular trans-Pacific traffic with these unwieldy vehicles of lumber transit such as is at present maintained between the Pacific Northwest and San Francisco Bay.

The fact that since the accidents to the first few rafts constructed on the western coast there have been no serious mishaps has not served to placate the maritime interests opposed to this form of rafting. In rebuttal it is pointed out that in the case of the rafts which were broken up by storms stray logs were cast up at points as far away as the Hawaiian Islands and the Mexican coast, and the premise is advanced that some of the ships which have within late years mysteriously disappeared in the North Pacific ocean owed their doom to stray logs from derelict rafts.

On the other hand the raft builders claim that with the lessons taught by long experience they have become so proficient in raft construction that the element of danger has been eliminated to as great an extent as it can be in any maritime enterprise, and furthermore, that the risk involved is, in proportion to the length of the voyage to China, no greater than that entailed by the

journey from the mouth of the Columbia river to San Francisco. The raft for the Orient will be constructed by a new company just organized under the laws of British Columbia, but which is a branch of the Robertson Raft Co., of San Francisco, which has built many of the large rafts and at the head of which is Mr. Hugh R. Robertson, formerly of St. John, New Brunswick, the inventor of the cigar-shaped raft.



FLOATING CRADLE IN WHICH LOG RAFT IS CONSTRUCTED.

The largest raft constructed up to this time was over 700 ft. in length and 50 ft. wide, and contained about 600,000 ft. of spars and piling, equivalent to 8,000,000 ft. of lumber, board measure. The raft designed for the Chinese port will, according to present anticipations, contain the equivalent of 10,000,000 ft. of lumber, or 25 percent in excess of the record construction up to date. If as proposed, however, the new raft is constructed here or at some other point on the Columbia river in order to be adjacent

to the fir timber which will be utilized, it may be necessary to put most of this increase into length since the necessity for towing the raft for some distance in the river renders it inadvisable to have a breadth much in excess of 60 ft. whereas there will be increased danger of groundings if the raft draws more than 23 ft. of water.

In view of the fact that this will be the first attempt to tow one of the large rafts across the ocean there is considerable speculation as to what premium will be placed upon the risk by the marine underwriters. The insurance men have never looked with any great favor upon the big rafts and even in the case of voyages from here to San Francisco have fixed a rate of 10 percent. The result has been that the raft builders have seldom felt justified in taking out a policy upon a raft for more than about one-third of its valuation, their aim being to merely guarantee reimbursement



BUILDING A LOG RAFT. LIFTING THE BIG STICKS INTO THE FLOATING CRADLE.

for the actual cost of construction and without consideration of the prospective profits which are said to sometimes run as high as \$20,000 in the case of a single raft.

It is not unlikely that a new time record will be established in the construction of the raft which is also to be

a record-breaker in size. Some of the earlier rafts required eight months or more to build but various economies have been introduced which have cut down the time for an ordinary log leviathan to a few months. One of the most important factors in present practice is found in the employment of the floating cradle. The earliest rafts constructed by Mr. Robertson were built on shore, resting obliquely upon timber foundations and were launched only with great difficulty and considerable danger to the raft. All this is obviated by the modern floating cradle, a skeleton framework, the ribs of which are so dovetailed that although any required weight can be supported, as the anchored cradle sinks deeper into the water with the increasing weight as the raft is assembled, the mere withdrawal of keypins suffices to permit the division of the cradle lengthwise into two sections, which when drawn apart allow the raft to slip into the water.

Iron chains are now largely depended upon to hold the logs of the raft in a compact mass and over 120 tons of chain are utilized in the construction of the average raft. A main chain of exceptional strength runs fore and aft through the center of the log mass and at right angles to this main chain at intervals of twelve feet are smaller cross chains which extend to the sides of the raft and there connect with encircling chains. By this arrangement so intimately are all the chains connected that any strain on the main chain during the towing process is communicated to and shared by all the other supports of the raft. As a further protection there is constructed at either end of the raft a bulkhead of heavy timber, held firmly in place by strong steel cables.

A 6 or 8 in. hawser is used in towing these large rafts. The average raft is taken down the Columbia river by one large tug, assisted by a stern-wheel steamer at the after end of the raft, the latter being provided primarily for steering purposes, for experience has demonstrated that when one of these rafts is stranded considerable difficulty may be encountered in getting it off. For ocean towing two sea-going tugs are provided.

The raft made up of spars and piling for export will be towed to the Orient by two of the most powerful tug boats at the port of San Francisco, and the little fleet will be accompanied by a collier or oil steamer with fuel for the tugs. Based on the valuations of \$45,000 and \$60,000 placed upon former rafts containing 450,000 and 600,000 linear feet of piling, respectively, the raft designed for Shanghai should invoice about \$75,000. It is estimated that the advanced price which will be derived from the sale of the logs when the raft is broken up at its destination in the far East will more than counterbalance the increased expense of towing the raft across the Pacific.



LAUNCHING A LOG RAFT FROM A FLOATING CRADLE.

vin last season, prompts some questions as to how this port is getting on with tonnage of that size. The reply is not so very flattering, though it might easily be worse. Of course it is easy to rush the lake tonnage forward faster than it is possible to improve the harbors and their appliances. It costs money to rebuild docks, deepen channels and lengthen slips and there is no quick and direct return in freight earnings as

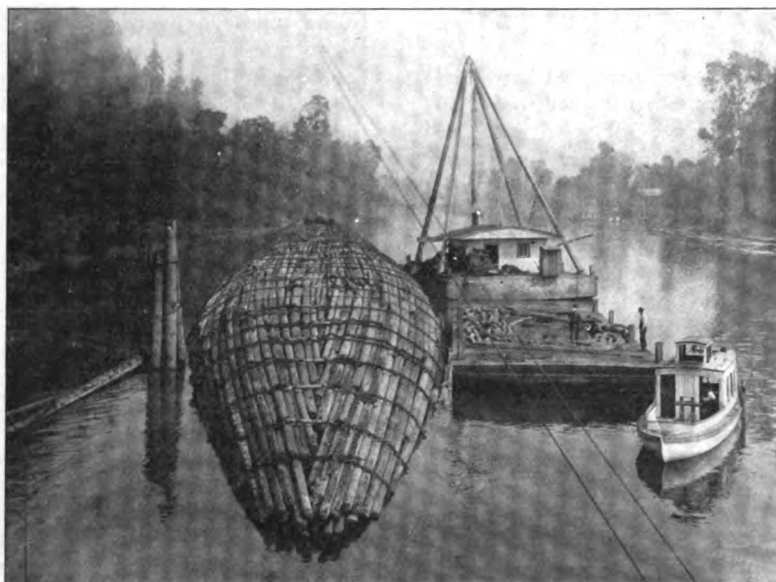
there is in the case of the vessels themselves, so the plan too often is to get along as well as possible with what there is and let sailing masters grumble if they will, so long as the business is done somehow.

Probably the only way to keep such things up to the standard of the vessels is to put them into the hands of vessel owners and even then it is a question if they would be so very prompt in tearing the old slow structures down and building faster ones, though what a lot of kicking it would stave off. No matter how slow we are in some direc-

tions the other slow fellow hears from it when he lets our vessels wait for him. Well, the Buffalo coal trestles are mostly decidedly old. They were all built in the days when a 5,000-ton vessel was a monster, only the Erie, which was pretty thoroughly reconstructed about half a dozen years ago, being at all modern, in the lake sense of the word.

LOADING COAL AT BUFFALO

Buffalo, Aug. 15.—The return to this port of the big steamer Ball Bros., after taking out the largest coal cargo of the season, 9,425 net tons, next to that of the Wol-



LARGE LOG RAFT WITH DERRICK AND TUG.

The experience in loading the big steamer Wolvin last season is not yet forgotten and she has not been after another cargo since. And why should anyone wonder? The steamer, when tied up alongside an ordinary coal dock is in many senses much the bigger structure, even above water, if she is not loaded and she is not so little in comparison when loaded. The coal spouts have no conveyors running over them and the coal must run through them to the deck of the vessel, but if the deck is a few feet higher than the dock end of the spout there is not much movement of coal. Then the device of filling the vessel's water bottom with water and inventing some way of listing her over till the coal will run are resorted to till at last it is found that a lot of men are needed to shove the coal through the spouts to the vessel till the monster is down in the water far enough for gravity to operate. Such a difference from the old loading in a few minutes a cargo of the old size!

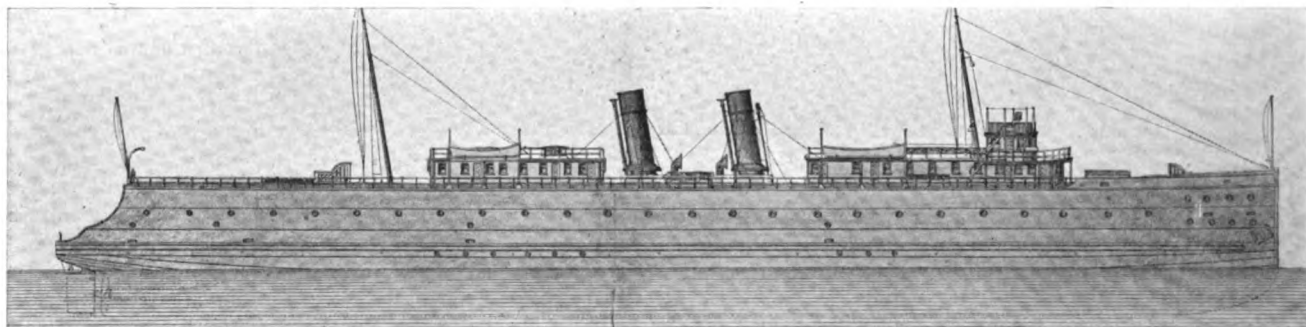
The captain then found out that the coal was all in the pockets and after supper, if the dock men were not too well unionized, he dropped his craft down from the fuel dock to the coal chute, took his cargo on and was off up the lake in a bit of time not worth counting. But now the

The harbor has some good ore docks. The new steel plant and Buffalo & Susquehanna docks may not take out a first class steamer in five hours, but they will in eight or nine and there is no complaint. Of the older docks the Minnesota, Lehigh Valley and Rochester & Pittsburg are fast enough for moderate-sized vessels. It may turn out that Buffalo is pretty well in line after all. As long as the handling business increases dock owners are not going to worry.

JOHN CHAMBERLIN.

ANOTHER CAR FERRY ROUTE

J. W. Ellsworth & Co., acting in conjunction with the Pennsylvania Railway and the Canadian Pacific Railway, have given a contract to the Great Lakes Engineering Works, of Detroit, Mich., for a twin-screw steel car ferry to operate between Ashtabula and Port Burwell. This combination of two leading railway lines with one of the most extensive coal shippers is likely to have far-reaching effects in the coal trade. It is the intention to operate the car ferry as many months in the year as possible, ten anyhow, and if it should be proved practicable, all the year round. The car ferry will have four tracks with a capacity for the transfer of thirty fifty-ton cars.



DRAWING SHOWING GENERAL OUTLINE OF PROPOSED NEW CAR FERRY FOR LAKE ERIE SERVICE.

spout is too short if it has any slant and soon the poor steamer is listing away over to the dock, and there is need of a gang of men in the hold to trim the cargo. No complaint comes down from the upper lakes that hard coal is too much broken up. The days when it used to fall so far, before reaching deck level, are about over. The skipper or some one else, has to find out now how many train loads of coal there are waiting by the trestle to be rushed up into the pockets after they have given up all they can hold.

Still it is not very likely that much will be done to adapt the coal trestle to the 10,000-ton vessel. There are too many vessels yet that do not need any changes. It would not be so very expensive to turn the spouts into conveyors of the extension sort and this would entirely do away with any other improvement of the dock, but when smaller tonnage gets so scarce that freights go up on account of it, as they used to do, there will be something done maybe.

As to grain elevators it is found that there are only three or four worthy the name of modern, but the difficulty with them is not what it is with the coal docks. The elevator leg can be put into the steamer's hold easily enough and with two or three legs the work is fast, but it often happens that the "lay" room for the vessel is scant. The land has not closed in on the elevator, but the vessel has pushed out to meet the land. Sometimes the slip is so situated that the vessel cannot get into it at all, but it happens in these days that the elevators are pooled and what one cannot do another can. They are going to rebuild the fallen Ontario elevator, that pushed its slip away out into the street when first built, but it is to be a town elevator and will find tonnage enough suited to it.

and will be equipped with engines capable of driving her twelve miles an hour. The car ferry will be 350 ft. over all, 56 ft. beam and 20 ft. deep from deck to keel, and will be of the enclosed type with accommodations for passengers and crew on the upper deck. She will be equipped with triple-expansion engines and Scotch boilers.

FREIGHT SITUATION

Instead of shoveling ore in some of the great open pit mines of the Mesabi range this week the operators have been engaged in bailing them out. Torrents of rain have fallen in the Lake Superior country during the past few days and a number of the more important mines are flooded. This has tended to seriously delay shipments of ore so that ore carriers have been congested at upper lake docks. It has been impossible for a great many of them to secure cargoes and the situation has laid special emphasis upon the fact that a surplus of tonnage exists on the lakes when anything interrupts its dominant trade.

Notwithstanding the serious delay, however, it is believed by authorities that the movement of ore during the present year will exceed 31,000,000 tons. The Steel Corporation will gauge its ore supply on Sept. 1 and determine at that time how much ore shall be moved during the balance of the season. With a maximum movement of 31,000,000 tons the Steel Corporation will have to move 18,000,000 or 19,000,000 tons in order to preserve its proportion of the total movement. Owing to the congestion at upper lake ports, Lake Erie docks are in excellent shape and are able to handle a greater tonnage than they are receiving. There is no thought whatever of any change in the ore rate as some of the newspapers

have indicated. Very little really would be gained by attempting to cut the wild rate, the greater part of the ore movement being under the contract rate of 75 cents.

The grain rate has advanced and is attracting ships.

CONTRACTS FOR TWO STEAMERS

Mr. James C. Wallace, president and general manager of the American Ship Building Co., has closed contract with Mr. Lyman C. Smith, of the United States Transportation Co., Syracuse, N. Y., for the construction of a freight steamer to be a duplicate of the Elbert H. Gary recently built for the Pittsburgh Steamship Co. and which now holds the cargo record for the great lakes. The new steamer will follow the Gary in general design, being built on the straight girder system with a total absence of stringers and stanchions below deck. The sides of the hopper rise in a straight line a distance of 9 ft. from the tank top and are then extended to the skin of the ship upon an inclined plane. The water bottom is 5 ft. 6 in. deep and will be used for water ballast in conjunction with a 9-ft. space formed by the hopper and the sides of the ship. This construction gives enormous water ballast capacity approximating 8,500 tons, and will make the steamer navigable in all sorts of weather. The new steamer will have thirty-four hatches spaced 12 ft. centers and her hold will probably be divided by three bulkheads. Her gross carrying capacity will be well over 12,000 tons. She will be 59 ft. over all, 54 1/2 ft. keel, 56 ft. beam and 31 ft. deep and will be equipped with triple-expansion engines with cylinders 24, 30 and 65 in. cylinder diameters by 42 in. stroke, supplied with steam from two Scotch boilers 15 ft. 4 1/2 in. by 11 ft. 6 in., equipped with Ellis & Eaves draft. This new steamer is for 1906 delivery.

W. A. Hawgood and Arthur H. Hawgood, of Cleveland, have given a contract to the American Ship Building Co., for a steamer to be a duplicate of the Amasa Stone, that is, she is to be 54 1/2 ft. over all, 52 1/2 ft. keel, 55 ft. beam and 31 ft. deep, and is to have triple expansion engines and Scotch boilers. This steamer is promised for April 15, 1906, and makes the fourteenth freighter that the American Ship Building Co., has under contract for next year's delivery.

Negotiations are pending for other steamers, but particulars are not as yet obtainable.

NEW STEAMERS

The Matson Navigation Co., of California, contemplate the construction very soon of two large steamers to be used in the trade between San Francisco and the Hawaiian islands. Bids will very shortly be asked for from the ship building concerns on the Pacific coast and in the east. This company own the steamers Enterprise and Rosecrans, and also several large sailing vessels. The Rosecrans is now being used entirely as an oil carrier. The island trade has now grown to such an extent that this additional tonnage can be used to profit.

The Dollar Steamship Co., of San Francisco, is also to have an addition to its already large fleet. In October a steamer about the size of the Hazel Dollar will be launched. She will be used in carrying lumber from this coast to the Orient, and returning with Oriental merchandise.

The Nillson Yacht Building Co., Baltimore, has received an order from a Brazilian steamship company for twenty-three life boats. Twelve of the boats are to be 23 ft. long and eleven are to be 26 ft. long.

The Harlan & Hollingsworth Co., Wilmington, Del., launched the Old Bay line steamer Virginia last week.

ITEMS OF GENERAL INTEREST

The four-master auxiliary schooner Francis Hyde, built for W. A. Engeman, of Brooklyn, N. Y., was launched Aug. 10 from the yard of the Kelley-Spear Co., Bath, Me. She is 168 ft. keel, 39 ft. beam and 12.5 ft. deep.

The national convention of the National Pilots' association was held at Philadelphia the first week of the present month. Capt. J. Edward O'Brien was elected president, E. W. Turnure, vice president, and J. H. Low, secretary and treasurer.

The United States steamer Fern, which is to be stationed at Duluth, is now en route there. Capt. G. A. Eaton, of the Minnesota Naval Reserve, is in command. The navigating officer is B. F. Howard, of Duluth. Mr. S. S. Williamson is the executive officer.

The dredge Caucus, built by the James Reilly Repair & Supply Co., New York, has passed her official trial tests very satisfactorily. During a three-days' trial she filled her bins of 800 cubic yards in from 35 to 45 minutes. She was designed to work on the bar at the entrance of Pensacola harbor.

The United States Civil Service Commission announces that on Sept. 13-14 an examination will be held to fill the position of assistant inspector of hulls in the steamboat inspection service in Philadelphia at \$1,800 per annum. Application blanks may be secured from the civil service commission at Washington.

The Commercial Towboat Co., Boston, has just awarded the firm of Bertelsen & Petersen, Border street, East Boston, the contract for the construction of a wooden towboat 80 ft. long, 18 ft. 8 in. beam and 9 ft. 10 in. deep. She will be equipped with a high-pressure engine 18 x 24 in. and boiler 13 ft. 6 in. long and 7 ft. 6 in. diameter.

"The Naval Pocket Book," edited by W. Laird Clowes, 2 Creed Lane, Ludgate Hill, London, England, is just out. This book gives a complete list of the navies of the world, including every battleship, cruiser, gunboat, submarine boat, torpedo boat, destroyer, harbor, hospital, training and subsidiary vessels, giving details of displacement, armament, protection, engines and coal capacity. An interesting table shows at a glance the comparative fighting strength of the principal powers.

The schooner Tornado, owned by the Compania Perliera de La Paz has been fitted out as a pearl fisher and will hereafter have La Paz on the Gulf of California as her home port. She was built for the Alaska Commercial Co., of San Francisco, and was used in northern waters, being then named Baranoff, from Prince Baranoff, the last governor of Russian America. Then she was bought by R. B. Fithian, of Santa Barbara, who fitted her out as a yacht, named her Rover and made a long cruise to the south seas in her. She was a fast sailer, making one trip from Santa Barbara to Tahiti in fifteen days. She also made several trips to Mexico. Her new owners named her Tornado because they own another schooner named Cyclone.

The steamship Minnesota, of the Great Northern Steamship Co.'s fleet, has just made a record in crossing the Pacific with the Japan peace commission in eleven days and twenty-three hours. The Minnesota's average speed was 14.73 knots, and is remarkable considering the fact that the steamer was unable to get the quality of coal required. Rough weather was experienced but the great steamer was so steady that her distinguished passengers scarcely noticed it. When the Minnesota reached Seattle she found the Dakota lying there. Both steamers lying lengthwise covered a distance of 1,260 feet in dock and presented a most interesting appearance. The Japan peace commission spoke in the highest terms of the steadiness of the Minnesota and the comfort aboard her.

COMMERCE OF THE GREAT LAKES

William Livingstone, president of the Lake Carriers' association delivered a splendid address at the exercises held at Sault St. Marie on Aug. 3 to commemorate the completion of the first canal to commerce. His address had to do with the commerce of the great lakes, a theme upon which he is an authority. He said:

"In 1843 Senator Norvell introduced a bill in the senate to grant lands for the building of the Sault Ste. Marie canal. Henry Clay, the silver-tongued orator of Kentucky, one of the foremost statesman of the nation, bitterly opposed the bill, declared that any money or grants made for that purpose would be utterly wasted, and pronounced this great waterway beyond the farthest bounds of civilization, if not in the moon. In an address delivered by Henry Clay to Lafayette in Washington, Dec. 10, 1824, on the occasion of Lafayette's



WILLIAM LIVINGSTONE.

last visit to America, he used the following language: 'The vain wish has sometimes been indulged that providence would allow the patriot after death to return to his country to contemplate the intermediate changes which had taken place; to view the forests felled, the cities built, the mountains leveled, the canals cut, the highways constructed, the progress of the arts, the advancement of learning, and the increase of population.' Could he stand here today and witness the celebration, view this beautiful city, with its many industries, happy homes, progressive people, and the city but yet in its infancy, and destined to be beyond a doubt, with its great natural advantages, one of the great cities of this nation, and when comparing the present with his prediction of sixty-two years ago, who could paint the emotions which would surge through his brain?

"A short review of lake navigation, the subject on which I am to speak, reveals a transformation scene even greater. While statistics are necessarily dry, it is an absolute necessity to use a few of them in showing and demonstrating the tremendous increase in the tonnage of the great lakes during the past fifty years. In 1855, fifty years ago, the total tonnage of Lake Superior, not only the cargo, but the ships that carried it as well, could be comfortably stowed away in the hold of any of the largest modern steamers that have come into commission during the past year, and that are daily passing through the canal.

"The movement of freight to and from Lake Superior previous to the opening of the state canal in 1855, was entirely by boat to Sault Ste. Marie, where the cargoes were unloaded, then taken across the portage one mile in length, and reloaded aboard the boats.

"In 1851 about 12,600 tons passed over the tramway portage; transshipments to Lake Superior ports consisted of hay, oats, dry goods, groceries and mining machinery to the value of a million dollars. Those to lower lake ports included copper, iron blooms, and fish, valued at \$675,000. During the fifty years the canal has been in commission, the yearly traffic has increased from the minimum of 14,503 tons to a maximum of almost 36,000,000 tons. The increase in tonnage of each year's traffic over that of the preceding year, has averaged about 20 percent. For each decade the average percentage of yearly increase and total tonnage are as follows:

1855-1864	40 percent	1,203,358 tons
1865-1874	12 percent	4,829,247 tons
1875-1884	17 percent	14,868,639 tons
1885-1894	17 percent	80,343,218 tons
1895-1904	12 percent	253,202,697 tons

Total 354,247,159 tons

"Colonel Davis in a report just issued states that the commerce of the lakes for 1904 was 24 times greater than that of 1880, three and one-half times that of 1890; that the value of tonnage for 1904 was nearly \$355,000,000.

"Astounding as the fact may seem, the new tonnage that has come into commission this present year, 1905, being built and under contract for 1906, will alone increase the carrying capacity of the lakes 7,220,000 tons. This increase alone is equal to the entire amount of ore carried during the year 1896. In other words, the ships that have come into commission this year and under contract in the great lakes shipyards, for 1906, could themselves carry the total ore commerce of Lake Superior of ten years ago. More than one-third of the general movement of ore has been the work of the past five years; more than three-fourths of total movement has been the work of the past ten years. In fact, so rapidly has the tonnage increased during the past five years, that the dream of today is the reality of tomorrow, and with the experience of the past, who shall say what the maximum will be? The building of the steamer A. B. Wolvin, the first of the present mammoth carriers, increased the tonnage carrying capacity 3,000 tons over any preceding vessel. Already it is being predicted that with a 25-ft. channel, which has been recommended by Colonel Charles E. L. B. Davis, as both feasible and practicable, that 15,000-ton ships will be built. And great as the present output of ore has attained, one of the best posted iron men in the United States, made the statement in Cleveland within a short time, that inside of ten years, the output of ore from Lake Superior would reach 45,000,000 tons in a single season.

"The tonnage of the Detroit river is equal to five times the foreign tonnage of New York harbor, and greater than the combined tonnage of Liverpool, London and Hamburg, and with tonnage to spare in addition. And it must also be borne in mind in connection with this that our season of

navigation on the great lakes is 230 days, whereas on the seaboard they have the entire 365 days. In no other place in the world can so animated water view be obtained as the Detroit river. It is a constant procession, ships never out of sight.

"It may be of interest to state that one of the new ships launched a few weeks ago, the steamer Elbert H. Gary, recently carried 10,877 tons of ore from Ashland, being the largest cargo ever shipped from Lake Superior. In fact, four new ships built by the Pittsburg Steamship Co., and recently gone into commission, if carrying wheat, the aggregate of the four single cargoes if reduced to flour, would be sufficient to furnish every man, woman and child of the 80,000,000 population of the United States, a one pound loaf of bread. Showing the inconsiderable amount of wheat as compared with ore, our banner crop of wheat was in 1901, over seven hundred million bushels of which three hundred and fifty millions were carried by lake transportation. Yet, if a canal were dug from Cleveland to Buffalo (185 miles), forty feet wide by twenty-five feet in depth the entire length, the 350,000,000 million bu. would fill it.

"The progress in the loading and unloading facilities of our vessels has increased in equal proportion. In the inception of the ore trade it was put aboard little schooners by hand labor of severest sort, and at a cost per ton that today would be fabulous. It took about four days to load a cargo of 300 tons, and the unloading of the cargo was an even greater undertaking. To get a cargo out of the hold staging had to be built. The ore was shoveled upon this staging, then from the staging to the deck, and then from the deck to the dock, making three handlings in all. By this process it took nearly a week to unload 300 tons, and the next move was by means of block, tackle and a horse. Only a few days ago the steamer G. W. Perkins unloaded 10,514 gross tons of ore in four hours and ten minutes, with only 32 men, the bulk of this being unloaded by clam shells. This is over 50 tons per minute and 1,800 pounds per second and is equal to 260 cars of forty tons capacity, making six trains of forty cars each. Ten years ago this would have been shoveled into buckets, taking a number of days and there is not a dock on the coast today could unload this cargo in a week.

"Frequent attacks are made on bills asking for appropriations for improving our waterways, and yet it is an indisputable fact that no expenditure of the government has ever been made that has yielded such dividends as the money invested to improve the channels of the great lakes. They are the lines of least resistance, but in a state of nature they are not always available. Their economic possibilities are irestimable when not obstructed by bars or tows. By the improvement of the channels connecting the great lakes to a depth of 20 ft., not only has the cost of the transportation been greatly reduced, but the enormous stimulus given to every manufacturer has added largely to the population and wealth of the cities encircling these waterways. The rate on a bushel of wheat from Chicago to New York in 1866, by the lakes and Erie canal, when the Sault canal draught was limited to 12 ft., was twenty-nine and sixty-two hundredths cents; whereas the rate on a 20-ft draught in 1904 was only four and seventy-one hundredths cents, or only about one-sixth, thus effecting a saving of eighty-four percent. The rail charges between the same terminals for 1866 were thirty-two and seventy-nine hundredths cents, and in 1904, eleven hundredths cents, showing a reduction of about two-thirds in the charges by rail. From this increase it appears that while the charges by rail and water had both been greatly reduced, in 1866 the water charge was ninety percent of that by rail, while in 1904 it was only forty-two percent.

"In 1892 Senator William P. Frye, in presenting his com-

mittee report, stated that for the year 1890 the total expenditure for water improvements on the Great Lakes had amounted to about thirty millions of dollars, or approximately one-fifth of the annual saving effected in transportation. Our waterways have acted as a most powerful regulator of rates. When it is considered that a diminution of one mill per ton on the railroads of the country effects a saving of nearly eight hundred millions to the shippers of transportation, the value of this restrictive power cannot be over-estimated. And as Prof. Lewis M. Haupt stated in a paper recently at a meeting of the American Philosophical society held in Philadelphia, that had the distinguished senator added as a recognized fact that such regulation by water does not reduce but greatly increases the revenues of the railroads, he would but have emphasized the commercial paradox which comparatively few persons appear to recognize.

"Major Potter in his annual report recently made, states that the saving of freight alone from Lake Superior in 1904, is within five millions of all the sums of money ever expended on the whole system by the general government. This is demonstrated by the fact that on the great lakes we have the lowest transportation on the globe. During the past five years the cost of moving a ton of freight one mile on the lakes has been ninety-six one hundredths of a mill. In last year, 1904, it was eighty-one one hundredths of a mill, whereas the cost of three and one-half mills per ton per mile is the lowest as far known reached on any railway. In fact, we carry a ton of coal from Buffalo to Duluth, almost a thousand miles, for what it costs to hire a laborer to put a ton of coal in your cellar, after being delivered at the curbstone of your house.

"Colonel Davis in his annual report just issued recommends about eight and one-half millions for improvements on our waterways, nearly eight millions of which is to be expended at Sault Ste. Marie and on the Sault Ste. Marie river. It includes \$3,390,000 for a new canal, \$3,000,000 for the West Neebish, improvements that are very important and necessary. We have already largely outgrown the present improvements and increased facilities are of the utmost importance. As an illustration, the Canadian canal of comparatively recent date, 10 years, is 900 feet in length and 60 feet in width. At the time of construction, it was planned and intended to be large enough to meet all future increase in tonnage. Already a vessel is under construction, and will soon be launched, that is 60 feet beam, and will therefore be unable to pass through the Canadian canal, and doubtless others will soon be built of equal or greater width. The Poe lock is 800 feet long, 100 feet wide, and when planned, was intended for four vessels to be locked through at one time. Today, only one of our latest steamers can be locked through, some of them being 569 ft. keel, and 55 feet beam, showing that big as these locks were considered, commerce has already overtaken them.

"As a chain is only as strong as the weakest link in it, in addition to what has been recommended, the most important and most urgently needed improvement on our great lake waterways is a new channel at Lime Kiln crossing. Owing to the large and constantly increasing tonnage on the lakes, and the rapidly growing congestion which already exists on the Lime Kiln crossing, it is imperative and of the utmost importance that all the effort possible should be brought to bear to secure at the earliest possible moment the passage of a bill for an appropriation for the construction of another crossing at the Lime Kilns. The tonnage has increased so enormously in the last decade, and the present decade is increasing at a much more rapid rate, that 90 percent of the risk of navigation now is in collision. Our modern ships are all of such lines and of such construction that the dangers of shipwreck or stress

of weather have been reduced to a minimum. The result is that our greatest danger in navigating the great lakes, is from collision in the narrow channels, and should one of our large modern ships be sunk in the Lime Kiln crossing, blocking the channel, it would tie up the entire tonnage of the lakes until she was removed, and the loss entailed thereby would be difficult to estimate. Great as the necessity was for the building of the new canal now under construction at the St. Clair Flats, there is still greater necessity of this crossing at the lower end of Detroit river. The risk under present conditions is exceedingly great and constantly becoming more so. The loss entailed by the sinking of the little steamer John N. Glidden in the Flats canal, and which only partially obstructed it, but entailed great loss to carriers and shippers, is too recent an object lesson to be forgotten. The sinking of the steamer W. L. Brown at the Lime Kiln crossing, which only blocked the channel partially, is a recent example of the great loss which may occur at any time, in a single channel. The steamer Douglass Houghton in 1900 before the present improvements were completed at the Sault Ste. Marie river, blocked the entire navigation of Lake Superior for a whole week, and entailed an immense loss at that time to vessel owners and shippers. The Lime Kilns in its present congested shape is a constant menace to navigation, and by all odds the weakest link in the chain at the present time. And every possible effort should be made to secure the passage of a bill for the building of a new channel, as even with the greatest success which we could hope to attain in the passage of a bill, long before a second channel can be completed, the present channel will be so congested and unable to accommodate the rapidly growing tonnage, as to entail innumerable detentions, and become an absolute menace and danger to navigation.

"I repeat that in this great commerce the dream of today is the reality of tomorrow. Who can say that he among us would be bold enough to predict what the centennial of the canal shall see would not undershoot the mark as widely as did Henry Clay sixty-two years ago? There are potentialities in this lake trade that are measureless and today we may be standing on the site of a future city, metropolitan in population and imperial in industry. It is already the gateway of a natural empire."

OBITUARY

Capt. James W. Millen, one of the earliest vesselmen on the lakes and for many years one of the prominent citizens of Detroit, died of apoplexy last week. While he had been ill for about two years no one suspected that his ailment was serious. Upon going to the breakfast room he was stricken with apoplexy, and when medically examined, it was found that his entire right side had been paralyzed.

Capt. Millen retired from active business about two years ago, shortly after his departure from the office of commissioner of the board of public works. Then he went to live in Romeo, Mich., where he has two brothers and a sister, Capts. William and P. L. Millen and Mrs. A. Hessler. He could not be contented away from Detroit, however, and several months ago he returned and purchased the fine old home at the corner of Lafayette avenue and Fourth.

Capt. Millen's entire business career has been in connection with the lakes and vessel interests, but he was widely known in Detroit through his connection with the board of public works during some of its most strenuous days. He was a member of the board with D. W. H. Moreland and Col. Kahlman, and later he was a member with Col. Kahlman and Marshall H. Godfrey when the famous ripper bill was passed, and Moreland was appointed as the one-man board.

It was Capt. Millen who barricaded the doors of the public works offices on the fourth floor of the city hall and did not surrender possession until compelled to by the courts.

Capt. Millen was born in November, 1830, at Millen's Bay, Jefferson county, New York, a settlement named after his father. He began sailing the lakes before the mast when a lad of twenty, his first boat being the schooner Pathfinder.



CAPT. JAMES W. MILLEN.

In three years he was mate of the Pathfinder, and he saved his money, invested it in vessel property and rose steadily. In nine years from his start, after sailing on the Montezuma, the Sovereign of the Lakes and the Flying Cloud, he purchased an interest in the Montezuma and sailed her as master from 1859 till 1866. Then he sailed the Montpelier for three years, and in 1869 he purchased an interest in the tug Sampson, plying on the Detroit river, and came to Detroit, commanding the Sampson until 1872 and the tug Niagara until 1879. In 1880 he purchased an interest in the Detroit Transportation Co., in the Lake Superior iron ore trade, and commanded the Iron Age the season of 1880 and the Iron Duke the season of 1881.

In 1882 he retired from active sailing on the lakes and gave his attention to managing the various interests he had acquired. At different times and for years he was general manager of the Red Star line, the White Star line, of the consolidation of the two; of the Duluth & Atlantic Transportation Co., and of the Hamtramck Transportation Co., president of the Buffalo Transportation Co., treasurer of the Swain Wrecking Co., and a member of the firm of Parker & Millen, doing a general marine insurance and chartering business. He sold out many of his interests to Mr. Parker when he retired about two years ago.

The S. P. Marts Co., Baltimore, has awarded a contract to the New England Co., Bath, Me., for a four-masted schooner 175 ft. long, 35 ft. beam and 13½ ft. deep.

The Spedden Ship Building Co., Baltimore, Md., is repairing the steamer Explorer of the United States Coast and Geodetic Survey fleet.

IMPROVEMENT OF LAKE CHANNELS

An impressive address upon the "Improvement of Lake Channels" was made by Hon. T. E. Burton, chairman of the committee on rivers and harbors of the house of representatives, at the recent exercises at Sault Ste. Marie in commemoration of the semi-centennial of the completion of the first canal to commerce. Congressman Burton said:

"The people of the United States have reason to be proud of this canal. It is befitting that here upon the banks of this waterway, after the lapse of fifty years, the citizens of Michigan should join with those of Canada and of other states of the union, in celebrating this anniversary. In the whole range of commercial history, no public work undertaken by city, state or nation has accomplished such remarkable results or conferred benefits so large in proportion to the cost. In forecasting its future the judgments of reliable observers have proven absolutely inadequate. The dreamer and the visionary have come nearest to the facts. It is difficult to tell which is the more impressive, the growth of its traffic or the magnitude of the industrial and commercial development which has followed it? In 1856 the first entire year in which boats could pass between Lake Superior and Lake Huron, 33,817 tons of freight passed through. This amount has been increased a thousand fold. Instead of tiny side-wheel steamers and sailing boats, having an average capacity of less than a hundred tons, we now behold the finest carriers on any inland sea, some of them carrying nearly twelve thousand tons. Steamboats have supplanted sailboats, larger boats are constantly being substituted for smaller. Iron construction displaced wood and now steel is taking the place of iron. Instead of the primitive facilities, with which it required several days to unload three hundred tons of iron ore, now in four hours and ten minutes, nearly twelve thousand tons has been unloaded. Instead of a partial supply for a few scattering furnaces, the major part of the iron ore smelted in the United States, passes through this river and with it a quantity of wheat equal to the whole average annual export in recent years.

"The quick succeeding changes can more fitly be described as revolutions than as the ordinary course of progress. The magnitude of this waterway with its thirty-six million tons of freight in the maximum year of 1902 may be comprehended by a comparison of its traffic with that of other canals and waterways and with some of the leading ports. In making comparison we can select as the most correct criterion, the number of tons carried through. It may be conceded that the freight which passes here has an average less valuable than that of the canals mentioned, but for the development

of any country or the utilization of its resources, the cheap transportation of raw materials and of articles of smaller value is the most important object to be obtained.

"We can also properly include the lock on the Canadian side, because if it should fail, the boats which utilize it would come here, and if one of these should be out of commission its traffic would go there. In brief, all three locks are parts of the same general improvement. Its greatest, its only competitor is the Suez canal which revolutionized the routes of commerce in the old world. Exact comparison is impossible, because statistics relating to the Suez canal give capacity of

cargo or net tonnage rather than the amount of freight carried. Yet we are justified in saying that the capacity or net tonnage of boats passing here is almost precisely twice as great as that of those passing through the Suez, and the cargo carried is between two and three times as great. Further, in the Suez canal tolls are levied amounting in the last year to twenty-three millions of dollars, while here any boat of any nation may pass on equal terms without discrimination or hindrance. If we consider the Kiel canal between the North Sea and the Baltic, which was opened in 1895 as if it were an event of world wide importance, the total traffic there is less than one-seventh of that passing here. In comparison with the Manchester ship canal constructed at more than six times as great a cost as that of these improvements on the American side, the tonnage carried through here is more than ten times as great.

Equally impressive is a comparison of the tonnage of this river with that of

certain ocean ports. The average annual cargoes passing through Saint Mary's river are fast approaching the total amount of those received at or shipped from all of the ports of the United States in our trade with foreign countries. The tonnage carried is greater than that of all the sea-going commerce, both domestic and foreign of the empire of Germany, or of France, greater than the combined sea-going commerce of Russia, Austria and Italy. If we adopt as our basis of comparison, ton miles, that is, multiply the amount of freight by the number of miles carried, averaging here 843.5 miles, the Saint Mary's river and the Detroit river stand in a class by themselves and upon each there is a greater traffic than that of all the other rivers and canals of the United States.

"Our railway system is the most elaborate in the world, exceeding in mileage that of all other countries and comprising over two hundred thousand miles constructed and equipped at a cost of thirteen and one half billions of dollars, yet on the same basis of ton miles the traffic here is one

CONTINUED ON PAGE 32.



HON. T. E. BURTON.

LAUNCH OF BATTLESHIP KANSAS

The battleship Kansas was launched from the yard of the New York Ship Building Co., Camden, N. J., on Saturday last, and was christened by Miss Anna Hoch, daughter of Governor Hoch, of Kansas. The Kansas is a sister ship of the Vermont now building at the yard of the Fore River Ship Building Co., Quincy, Mass. The keel plates of the Kansas were laid on Feb. 10, 1904. She is known as a 450-ft. battleship, and her contract calls for a maintenance of eighteen knots' speed for four consecutive hours. The hull is of steel throughout, and is fitted with bilge and docking keels. Her general dimensions are as follows:

Length on load water line 450 ft., length over all 456 ft. 4 in., extreme beam to moulding 76 ft. 5½ in., to outside of plating 76 ft. 8 in., extreme beam to outside of armor 76 ft. 10 in. Her trial displacement will be 16,000 tons, and when she goes on her speed test she will carry 900 tons of coal, although her bunker capacity is 2,200 tons. Sixty-six tons of feed water will also be carried on her trial trip. Her trial draught to bottom of keel will be 24 ft. 6 in., bottom of keel to moulded base line 15½ in.

Her armament will be: Main battery, four 12-in., eight 8-in., twelve 7-in. breech-loading rifles. Secondary battery, twenty 3-in. (or 14 pounder) rapid-fire guns, .50 calibre in length; twelve 3-pounder semi-automatic guns, six 1-pounder automatics, two 1-pounder semi-automatics, two 3-in. field pieces, two machine guns of .30 calibre, and six automatic guns of .30 calibre. Mounted in pairs, the 12-in guns will be placed in the two turrets on the center line, one forward and one aft; the 8-in. guns will also be mounted in pairs in four turrets on the quarter, separated by two-inch nickel steel splinter bulkheads; the 7-in. guns will be mounted on the gun deck, where six of the 3-in. guns will also be placed, two fore and four aft, while six will be mounted on the main deck in the superstructure, six on the upper deck and two on the bridges.

The Kansas will have a complete main belt armor, 9 ft. 3 in. wide on the water line, having a uniform thickness of 9 in. throughout the magazine and machinery spaces, tapering to 4 in. at the ends. Seven-inch casemate armor will protect her between the main belt and main deck. This armor will extend to the limits of the magazines at both ends. The 12-in. barbets will extend from the protective deck to about 4 ft. above the main deck, and consist of 10-in. armor in front and 7½ in. armor at the rear, above the gun deck. Between the gun and protective deck it will be of a uniform thickness of 6 in. The 8-in. barbets will be 6 in. thick in front and 4 in. in the rear. The protective deck will extend from stem to stern, being flat amidships, but sloped at the sides and at each end.

Her propelling power will consist of the vertical, twin-screw, four cylinder, triple expansion type of engine, of a combined indicated horse power of 16,500. The ship is to be provided with an ice plant with a cooling capacity of three tons of ice daily, an evaporating plant of 16,500 gallons capacity, and a distilling apparatus capable of condensing 10,000 gallons of water a day. She will be equipped with powerful searchlights, and her masts arranged for wireless telegraphy.

Designed for a flagship, accommodations have been provided for one flag officer, commanding officer, chief of staff, nineteen wardroom officers, ten junior officers, ten warrant officers, and 813 men, including marines.

Oxner & Story, Essex, Mass., launched the schooner yacht Shepherdess last week. The Shepherdess is 109 ft. 10 in. over all, 82 ft. on the water line, 22 ft. 3 in. beam and draws 10 ft. 6 in. of water. She is built for heavy weather.

PURIFYING THE ISTHMUS

Chairman Shonts, of the Panama Canal Commission, in an interview in New York stated that he believed the health of the employe on the line of the canal should have precedence over the digging of the ditch. He said:

"We went to Colon with Mr. Stevens, the chief engineer, to see what had been done and what should be done. We found the first thing of importance to be the housing and supplying of 20,000 men. When our government first took hold of the canal every effort was directed toward making the dirt fly. I think this was a mistake. Time should have been given toward preparing for the task by making arrangements to care for the employes.

"I found this one of the conditions remaining to be settled. It is true also that the laborers were not promptly paid and that matters were becoming congested on the railway and steamers."

Continuing Mr. Shonts said that because the people of the isthmus were not prepared for the addition to the population, supplies for living were advanced to such a degree that laborers could not earn enough to support themselves. Sub-commissary stations were, therefore, established, and an arrangement has been made to continue this system until prices become normal.

"Of course, I found the freight congestion causing considerable trouble, but soon found that by applying those practical, up-to-date road methods of the United States that in thirty days the trouble would be eliminated. There is about 6,000 tons on hand now. This freight was ordered by the old commission to be delivered at certain intervals. We hurried the matter up and urged prompt shipment with the result that it will get to the terminal point at once.

"The question of double-tracking the railroad is much misunderstood in this country. The fact is, it is ample to more than handle the commercial business now, provided the proper methods are enforced. Without a wish to criticise any one, I can say that the tropical conditions prevail.

"As to double-tracking the road, that cannot be done at present, even if necessary, but as the work of getting out the dirt progresses we can easily keep up with the work with extra trackage. We have supplied refrigerator cars for the road. There are about 10,000 employes on the isthmus now, this number includes the laborers. I have other things to say later on after I report to the president."

Mr. Shonts said there was in reality no yellow fever scare to speak of at the isthmus and that the total number of cases in Panama during August up to the time of his sailing was only thirty.

MOTOR YACHT CLUB

With the rapid increase in the use of the motor boat, the sentiment has been growing among prominent men identified with the sport that a representative club should be formed which would enjoy the same high standing in this country at the Motor Yacht Club does in England. With the hundreds of motor boats in use, and their number rapidly increasing it has been deemed advisable to arrange for a meeting to organize such an affair and a call will be sent out in a few days for an organization meeting to be held at the Hotel Manhattan in New York.

Because of his wide acquaintance and his knowledge of the motor boat sport, Hugh S. Gambel has been selected to arrange for the first meeting of those interested in organizing the motor boat club. It is planned to have a home on the Hudson river that can easily be reached by automobile or street car and it will provide a home for the speedy boats that are now so common on the waters around New York. Such

a club would be instrumental in increasing the interest in the sport by keeping it on a high level and assist its members in the better understanding in handling the motor craft. Some twenty or more men identified with the sport have already put their names down on the call for the first meeting. Information regarding the club can be secured by addressing Hugh S. Gambel, 314 Madison avenue, New York.

SUMMARY OF NAVAL CONSTRUCTION

The summary of naval construction, issued by the navy department, would indicate that the Connecticut building at the New York navy yard has surpassed in percentage in construction the Louisiana building at the yard of the Newport News Co. The Connecticut is now almost one percent in advance of the Louisiana. Commendable progress is also being shown on all vessels that are actually under construction. Following is the summary:

Name of Vessel.	Building at	Percent of Completion, July 1, Aug. 1, 1905.
BATTLESHIPS.		
Virginia	Newport News, S. B. & D. D. Co.	89.71 91.37
Nebraska	Moran Bros. Co.	75.00 77.00
Georgia	Bath Iron Works.....	82.66 85.00
New Jersey	Fore River Shipbuilding Co.	86.2 87.7
Rhode Island	Fore River Shipbuilding Co.	88.8 92.1
Connecticut	Navy Yard, New York	80.74 83.67
Louisiana	Newport News, S. B. & D. D. Co.	80.79 82.81
Vermont	Fore River Shipbuilding Co.	53.6 57.1
Kansas	New York Shipbuilding Co.	55.1 57.8
Minnesota	Newport News, S. B. & D. D. Co.	68.00 69.9
Mississippi	Wm. Cramp & Sons	31.28 34.40
Idaho	Wm. Cramp & Sons.....	29.57 33.22
New Hampshire	New York Shipbuilding Co.	11.2 15.2
ARMORED CRUISERS.		
California	Union Iron Works	78.3 80.4
South Dakota	Union Iron Works	76.1 78.9
Tennessee	Wm. Cramp & Sons	79.40 82.02
Washington	New York Shipbuilding Co.	79.1 82.03
North Carolina	Newport News, S. B. & D. D. Co.	9.14 12.2
Montana	Newport News S. B. & D. D. Co.	7.98 10.81
PROTECTED CRUISERS.		
St. Louis	Neafie & Levy S. & E. B. Co.	67.4 71.4
Milwaukee	Union Iron Works.....	75.2 79.00
Charleston	Newport News S. B. & D. D. Co.	97. 99.
GUNBOATS.		
Paducah	Gas Engine & Power Co.	88.9 92.4
TRAINING SHIPS.		
Cumberland	Navy Yard, Boston.	95. 95.
Intrepid	Navy Yard, Mare Island.	97.5 97.5
SCOUT CRUISERS.		
Chester	Bath Iron Works	0. 0.
Birmingham	Fore River Shipbuilding Co. . .	0. 0.
Salem	Fore River Shipbuilding Co. . .	0. 0.
TORPEDO BOATS.		
Goldborough	Wolff & Zwicker	99. 99.
O'Brien	Lewis Nixon	99. 99.
COLLIERS.		
Erie	Navy Yard, New York	0. 0.
SUBMARINE TORPEDO BOATS.		
Sub. T. B. No. 9	Fore River Shipbuilding Co. . .	0. 12.6
Sub. T. B. No. 10	Fore River Shipbuilding Co. . .	0. 11.5
Sub. T. B. No. 11	Fore River Shipbuilding Co. . .	0. 11.5
Sub. T. B. No. 12	Fore River Shipbuilding Co. . .	0. 11.5

SEVERAL STEAMSHIP CONTRACTS

Contracts for vessels for the merchant service aggregating over \$2,000,000 have been secured during the past week by the Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, being the greatest amount of work ever secured in such a short time. The New York & Cuba Steamship Co., commonly known as the Ward line, has given contract for two four-deck passenger and freight steamships similar to the Morro Castle which was built by the Cramps. These ships will be 400 ft. between perpendiculars, 50 ft. beam and 30 ft. deep and 24 ft. draught. Six months ago the Cramps were awarded contracts for two steamers by the Ward line, making four now in all that they are building for this company. These vessels will ply between New York and Cuba and Mexican ports.

The Southern Pacific Steamship Co. has given contracts for four passenger steamers to ply between New York, Galveston and New Orleans. They are to be 350 ft. long with triple expansion engines and excellent accommodations for passengers. Two of these vessels will be built by the Cramps, one by the Fore River Ship Building Co. and one by the Newport News Co.

The Metropolitan Steamship Co. has given an order to Roach's Ship Yard, Chester, Pa., for two large passenger steamers for service between New York and Boston to be about 400 ft. in length. It is interesting to note that these vessels are to be driven by turbine engines aggregating 10,000 H. P. and designed for a speed of 20 knots.

COMMODORE'S FINE REMITTED

Collector of Customs Wm. Penn Nixon yesterday received a letter from Secretary Metcalf, of the department of commerce and labor, remitting the fine of \$500 imposed upon the steamer Commodore of the Western Transit Co. some weeks ago for carrying stevedores from dock to dock while loading and discharging its cargo.

The decision in the case was a source of much satisfaction to managers of the railroad line steamers, as it fully approves of the custom of many years' standing, and the steamers will now be permitted to carry the laborers from one dock to another, either for unloading or loading freight. The ruling received by the collector reads as follows:

"The department is of the opinion that stevedores thus temporarily employed while the vessel is moving from dock to dock at the port of Chicago and in its vicinity are not passengers for the purpose of sections 4,417 and 4,465, revised statutes (referring to carrying passengers more than the crew on a freight license). Such appears to have been the long standing usage and interpretation on the lakes. Under similar conditions, though for longer distances, in the West India trade stevedores for years have been regularly considered as part of the crew."

The infraction of the steamboat inspection rules for which the Commodore was fined grew out of the fact that the boat had been loading and discharging freight in the Chicago river. She also had merchandise consigned to the Rock Island railroad dock at South Chicago, and, following the usual custom, took the stevedores with her to unload the freight at that point. Upon the steamer's return Steamboat Inspectors Mansfield and Peck reported her as having carried some thirty persons on a freight certificate in violation of the rules, and the fine was imposed.

Charles E. Peabody, president of the Puget Sound Navigation Co., Seattle, Wash., is authoritative of the statement that it is the intention of the company to ask for bids on two steel boats to cost in the neighborhood of \$100,000 each, to replace their present wooden craft.

Improvement of Lake Channels

CONTINUED FROM PAGE 29.

seventh as great as upon all the railways of the United States. In this same connection it will be instructive to compare the cost with that of railway freight charges. The average charge per ton per mile on freight carried here is but a trifle in excess of one tenth as much as upon railways. The freight charge on railways per ton per mile being .78 of a cent, while that upon the lake channels of which this river is a part, is but .81 of a mill. Comparison can be challenged with equal confidence in commercial and industrial development. This waterway is the most essential link in a waterway one thousand miles in length affording cheap transportation for the grain of a greater interior region and giving an impetus and an increased reward for agricultural production nowhere surpassed. It is probable that in the future, the development of this great producing region will be much greater than in the past. The supremacy of the United States in the manufacture of iron and steel acquired within the last decade, would be impossible without this canal. The bringing together of the ores of Minnesota and Wisconsin and the coal of Pennsylvania, Ohio and West Virginia gives an assured advantage in the manufacture of these staple articles which more and more are becoming the world's structural material and will enable the United States to permanently distance all rivals. It is to be noted that this improvement has enjoyed its greatest increase during the last twenty years and especially in the last decade. Those who study the development of American commerce will always give full credit to the state of Michigan for having initiated this great enterprise in the face of opposition and even of ridicule. The people of the State in the construction of the first lock opened fifty years ago did the best they could with the limited resources at their disposal and with the imperfect foresight of that time; but the great development of commerce in this region though from the first increasing rapidly in percentage was postponed thirty years. It was not until after 1885 that these improvements became a colossal factor in the industrial growth of the country. From 1869, the year of the opening of the Suez canal, until 1885, the increase in the traffic of the Suez was greater than here. The freight carried there was greater until several years after 1885. At about this time events gave to this canal its more recent importance. Among them was the completion of the Weitzel lock in 1881, the deepening of other channels of the great lakes, the discovery of the iron ore fields of Minnesota. It should also be considered that after any great improvements there is almost always a period of inertia during which its full benefits are neither realized nor utilized. The most remarkable development of recent years has been in the shipments of iron ore, the total quantity of this commodity carried down was but 1,235,000 tons in 1885. In 1895 the quantity had reached eight millions, in 1900, sixteen millions, in 1902, the banner year, twenty-four millions. It is not a daring estimate to foretell that within ten years the annual quantity will be between forty and forty-five millions of tons. Shipments of lumber will no doubt decrease. Copper and miscellaneous freight may not show any marked increase but there is an unlimited field for development in shipments of iron ore and in a less degree of coal and of grain.

"In the midst of our congratulations it is well to consider some of the dangers which confront us. Conditions are not altogether ideal. This is an age of remorseless competition in which the cheapest and most convenient instruments are sought and those which are obsolete or less efficient must go to the wall. It is a characteristic feature of the traffic

that east bound freight is much greater than west bound. If this inequality could be removed, rates of carriage on the lakes could be very considerably reduced. While it is desirable that traffic in each direction should become more nearly equal, the present tendency is rather toward increased disparity.

"What will become of the smaller ships? It is inevitable that for the great bulk of the trade, the larger, even the largest size will be employed and there is danger that the great fleet of small vessels will become less and less valuable year by year. In the trade upon the lakes the long haul is the most profitable, and traffic between nearby points is comparatively insignificant. This is not only a tendency here but everywhere. Population is increasing. Wealth is increasing much more rapidly. But transportation is increasing much more than either. Not merely are the bulk and weight of commodities carried on the increase, but also the distances which the commodities are carried.

"The merchant now seeks the very best and most useful article even if it must come from the uttermost parts of the earth. Conditions here are governed not merely by the superior advantages of railways for short distances, but the great bulk of the traffic is made up of a few articles which must be carried for long distances. Could these smaller ships be used for the shorter distances, a great deal of floating property which according to present indications, must depreciate in value could serve a most useful purpose in developing the states bordering on the great lakes. It is not the deepening of channels alone or the construction of these locks which caused the development of this region, to these must be added the terminals at the various ports, the machinery for loading and unloading, which far surpasses any similar equipment in the world. When other ports and other localities in the old world and the new provide similar improvements and thereby diminish the advantages of the localities served by the traffic it is to be hoped that the ingenuity, the push and the foresight of the men of the great lakes may enable them to provide still further improvements, so that as now, they may continue in the forefront. I am not one of those pessimists who believe that the iron ore supply in the country adjacent to Lake Superior will be exhausted in a few decades. I cannot avoid the conviction that the hills and valleys near to the lakes have been barely scratched as yet; that other mines await the prospector, further afield perhaps, but nevertheless abundant in supply for generations yet to come, so that as the world more and more demands the products of iron and steel, the purchaser must look more and more to the regions tributary to this canal and the waterways of the great lakes. No such development as has been attained here could be accomplished by natural advantages alone. It is not fertile fields nor rich mines, nor deep channels which make a country great, either from an industrial or from a political standpoint. There must be strong and stalwart men of the progressive type ready to grasp the opportunities of each year and always alert to keep in the lead. Men as well as resources make a state rich and prosperous and in that which has been gained, credit must be given to the energetic men who have planned and managed these great enterprises—to the thousands of miners, to the sailors on the ships and to all who have toiled to accomplish what we see to-day. In our complex and progressive civilization, all of those who go to make up our varied population bear their share and are necessary to secure the best results.

"I cannot omit to express my congratulations to the old men here to-day who were the pioneers in this great development; to Peter White the explorer and discoverer of untold possibilities in the trackless waste of the Upper Peninsula;

to Mr. Harvey, the builder of the first canal, fortunately they are with us, after more than fifty years to see the realization of their labors and sacrifices. The years have rolled swiftly by, but events fraught with consequences of overshadowing importance have intervened in even more rapid succession. We may add our tribute of honor to the many who with like energy and hope bore the heat and burden of the day, but who have been taken from us. Foremost among them stands General Poe, the engineer of the latest lock, without whose comprehensive foresight of the future demands of lake traffic, this great procession of passing ships would hardly have been possible. This magnificent lock is his fittest monument.

"Where are the young men who will take the place of those whose work we celebrate? No conquering army listening to the inspiring notes of martial music and gazing upon fluttering standards behind which they must conquer or die, were ever more alive or ready to respond to the cry of 'Onward March' than are the young men of to-day. They are ready for all emergencies; to them it may be said with more impressiveness than ever, 'To be living is sublime.' Will their merits and the benefits of their achievements compare with those of the men who are gone or who are nearing the twilight hour?

"This occasion is in a peculiar sense a celebration of international enterprise. The connecting waters of the great lakes lie between the United States and the Dominion of Canada, countries peopled by those of the same race, who speak the same language and who in an exceptional sense look forward to the same destiny.

"The mariner does not stop to consider whether the course of his boat lies through channels of Canada or of the United States, the boundary between us is a mere line upon the map. Our interests, our hopes and our achievements more and more, year by year, are one, and it is appropriate that we should to-day, on both sides of the boundary line, repeat the sentiment expressed in the last speech of President McKinley. 'Let us ever remember that our interest is in concord, not conflict; and that our real eminence rests in the victories of peace, not those of war.'

"The progress of civilization, the enjoyments of the comforts and conveniences of life, the highest standard of manhood will be best promoted by a growing sentiment for peace and good will among the peoples of the earth. Here on this border line between the United States and Canada may we erect twin pillars which will be the beginnings of the splendid temple of peace. We may thus attain what one of our great legislative leaders has termed a development of resources great beyond the comprehension of any mortal and the diffusion among all of riches to which the glories of the Arabian Nights are but the glitter of the pawn shop.

"And yet more important we shall have part in that development of individual opportunity, of liberty and of high moral standards, which now and always will place the English speaking races in the forefront of the world's civilization."

CHICAGO GRAIN REPORT

Chicago, Aug. 15.—The past week has been one of fairly active shipping on the basis of 1¼ cents to Buffalo, the through Montreal basis having ruled moderately firm at 3¼ cents to 3½ cents per bushel. Receipts holding in good order; weekly movement from country points aggregating some 1,861,000 wheat, some 1,445,000 corn and 3,173,000 oats. Line interests are experiencing a good movement in package freight, the last weekly report noting lake routing of 85,000 barrels of flour, which exceeds by about 30,000 barrels the previous period.

It is most encouraging to note that, in the very recent

report of the crop bureau of United States department of agriculture, the indicated yields of grain for 1905 make for a greater total than any previous production. Corn is especially in the majority by 70,000,000 bu., and moreover the entire harvest promises an exceptionally fine quality. The technical figures suggested by this highest official authority are as follows:

	Indicated Yield, Aug. 1, 1905.	Official Yield, 1904.
Winter Wheat	424,400,000	325,375,000
Spring Wheat	207,073,000	227,025,000
Total	691,473,000	552,400,000
Corn	2,593,000,000	2,467,401,000
Oats	880,478,000	891,354,000
Rye	27,007,000	27,500,000
Barley	132,000,000	136,000,000

The total weekly grain movement, as summarized by E. J. Fleming & Co., in the figures below, will note a considerable advance from last report, and in the distribution of which there was: via all rail lines of wheat, 183,400 bu.; corn, 383,700 bu., and oats, 1,056,000 bu.; via lake to Buffalo and other American points, of wheat, 213,000 bu.; corn, 1,401,000 bu., and oats, 38,000 bu.; and to Canada points via lake, of corn, 649,000 bu., and oats, 205,000 bu.

Lake and Rail Shipments:

	This week.	Last week.	Same week last year.
Wheat	410,090	223,700	519,891
Corn	2,970,774	2,145,786	2,089,500
Oats	1,300,405	1,333,032	1,107,135
Rye	1,535	3,000	6,890
Barley	4,925	10,661	21,718
	4,687,789	3,716,179	3,745,134

Lake and Rail Shipments:

	Since Jan. 1, 1905.	Same time last year.
Wheat	7,951,711	8,622,834
Corn	57,524,487	40,661,464
Oats	32,170,955	28,365,970
Rye	616,251	824,577
Barley	2,442,415	2,760,545
	100,606,819	81,235,399

Stocks in Private and Public Elevators:

	This week.	Last week.	Same week last year.
Wheat	4,648,000	3,465,000	2,488,000
Corn	3,684,000	5,229,000	4,175,000
Oats	5,125,000	3,605,000	2,480,000
Rye	125,000	120,000	553,000
Barley	15,714	20,714	147,000
	13,597,714	12,439,714	9,843,000

The stockholders of the Gilbert Transportation Co. have authorized the directors to increase the capital stock of the corporation from \$500,000 to \$2,500,000. The company has elected the following directors: Prentiss Howard, Webster, Mass.; Eli Attwood, Lebanon, Pa.; D. E. Ford and A. R. Carver, New York city; M. L. Gilbert, O. A. Gilbert, B. F. Williams and C. H. Williams, Mystic, and Thomas Hamilton, C. R. Hanscom, and F. W. Allen, New London.

The Lindstrom Ship Building Co., San Francisco, now has three vessels on the ways for San Francisco parties. One is for Oliver M. Olsson, one for Beadle Bros., and the other for C. H. Higgins. The schooners for the first two named will be 180 ft. long, 38 ft. beam and 12½ ft. deep. Mr. Higgins' will be 176 ft. long, 38 ft. beam and 12½ ft. deep.

WE WOULD HAVE HAD THE SHIPS

Editor *Marine Review*: Answering the communication of Mr. Walter J. Ballard to the effect that "We must have ships"—for the Cuban trade, I would observe that, if our act of May, 1828, had not been passed, we would have had them. At the time of this legislation only American and Spanish vessels could carry between Cuba and the United States. Now, Cuba takes the place of Spain. Mr. Ballard shows that of \$68,526,000 total commerce in six months ending June 30, 1904, with Cuba, only \$26,287,000 of value were carried by Cuban and American vessels—the balance by British, Norwegian and Spanish. What else could we expect? We opened the door for all vessels of all the nations of the earth to carry back and forth between our own and any country of the world,—how can we expect to have the business and give it away too? Does Britain, Norway and Spain thank us for our Cuban trade? Are we compelled to give it to them? No, we are simply damphools to do it.

The marine commission wants this folly continued—they love to see foreign flags in our ports. They propose to collect some extra tonnage dues and subvention our vessels—this to remunerate our owners for the tolerance of a foolish policy, as though that would drive out foreign vessels and install our own in the trade. Vain thought. There is no soundness in it, no statesmanship—only childishness. By what right does congress give away a trade belonging, not to its members to bestow on any nation, but to the people who may choose to engage in it? False to their trust on the part of congress and the administration, is the ruling reason why we have no ships for the Cuban or any other foreign carrying trade.

The Federal government is under a solemn compact with the maritime states to enact and maintain "navigation laws" that will secure our people in their shipping rights. This compact enabled the states to consent to the union under the constitution. Without it the great republic would have lingered in the womb of time and perhaps been stillborn. The federal government can ill afford to repudiate its pledge of protection to the shipping interests, but it has done so, and continues to do so, and may never have the manliness to do its own people justice.

WILLIAM W. BATES.

ADVERTISING ENGINEERS

Products of scientific manufacture require promotion even more than do commercial articles of general consumption. The engineer or manufacturer who has spent years of work and thought upon the perfection of a new product or machine accepts as axiomatic that, because there is a need for it, there will be a demand. He forgets that before his possible customers will give up their accustomed and familiar methods to adopt the new, they must to some degree pass over the same mental course that he has traversed, and, unless educational measures are adopted, this is apt to be a matter of many years. To introduce his improvements in steam engine valve gears, Corliss was forced practically to giving his machines away. The Parsons steam turbine was an engineering success ten or twelve years before it became a commercial success in this country. On the other hand, the turbine centrifugal pump, by modern advertising methods, has been made commercially successful in a period of two years, the sales of the third year being four times those of the first, while a prominent cordage manufacturer has increased the sales of his transmission rope twenty times over within a few years by means of advertising.

Not only, however, do engineering products require an educational publicity campaign for their introduction within

reasonable time but all the methods of general advertising, suitably modified are in some way applicable in promoting their sale. There is a science of economy of communication and apprehension, as of other things, and some ways of overcoming psychological inertia are less expensive and attended with less friction than others.

Recognizing these facts, some engineering and manufacturing concerns have established advertising departments and have placed them in charge of men of high ability. This plan, however, is more expensive than most businesses justify and many firms attempt to handle the work through already overburdened executive officers or else turn it over to clerks.

To meet these conditions, Mr. Halbert P. Gillette, M. Am. Soc. C. E., M. Am. Inst. M. E., formerly associate editor of *Engineering Notes*, and Mr. Geo. H. Gibson, A. M. Am. Inst. E. E., J. M. Am. Soc. M. E., formerly manager of publicity for the International Steam Pump Co., manager of the advertising department of the B. F. Sturtevant Co., and editor of the Westinghouse Co.'s publishing department, have formed a partnership as "advertising engineers," under the name of the Geo. H. Gibson Co., with offices in the Park Row building, New York city. They undertake to conduct a firm's advertising in the same manner as would a department in the firm's own offices, and are not advertising agents in the usual sense of the term, as they receive no commissions, rendering only service and leaving the actual purchasing of space and printed matter in the client's hands.

MORTALITY AMONG STEERAGE PASSENGERS

Acting Secretary Murray, of the department of commerce and labor, has received a report from Collector Stranahan, of New York, showing that during the past three fiscal years, ended June 30, 1905, from the ports of Europe 1,932,934 steerage passengers embarked for New York, of whom 423 died on the voyage, or about twenty-two deaths per 100,000 passengers. Allowing twelve days for the average voyage the rate is equivalent to an annual death rate of about six and one half (6.56) per 1,000. (The last federal census shows the annual death rate per 1,000 in 1900 in New York city was 20.4, in Washington, 22.8, and the lowest rate for large American cities, St. Paul, Minn., 9.7, and Portland, Ore., 9.5. The federal census gave the death rate for Hungary at 30.3, Italy 24.6, Germany 22.8, and Norway 16.5.)

The highest monthly rate for the three years was January, the month of smallest travel, thirty-eight deaths out of 87,260 in the steerage; the lowest rate, also thirty-eight deaths, out of 256,838 steerage passengers, was May, one of the months of heaviest steerage travel to New York. From northern Europe there were 242 deaths out of 1,351,221 steerage passengers; from southern Europe 181 deaths out of 581,713.

Of the steerage passengers 31,873 were babies under one year and 116 more were born in the steerage, two mothers dying in child birth; 126,993 were children over one and under eight years, and 1,774,068 passengers were over eight years. Under eight years 211 died; over eight years 212. The census figures for 1900 give deaths under nine years in the United States, so exact comparison is not practicable. In the steerage one and one-third died out of every 1,000 children under eight years.

Only one steerage passenger out of nearly two millions died on shipboard from accident, and only one from yellow fever. Twenty-three committed suicide and seven disappeared (suicide, accident or murder).

The Metropolitan Steamship Co., of New York, will put on two turbine steamships for service between New York and Boston. The steamers are to be built at Roach's shipyard, Chester, Pa.



Vol. XXXII.

CLEVELAND, AUGUST 17, 1905.

No. 7.

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ORANGE PEEL AND CLAM SHELL TYPES

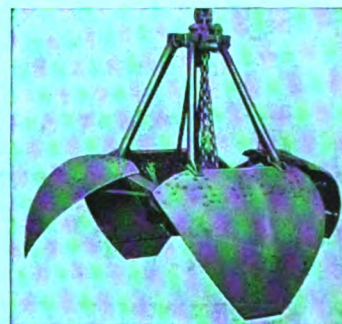
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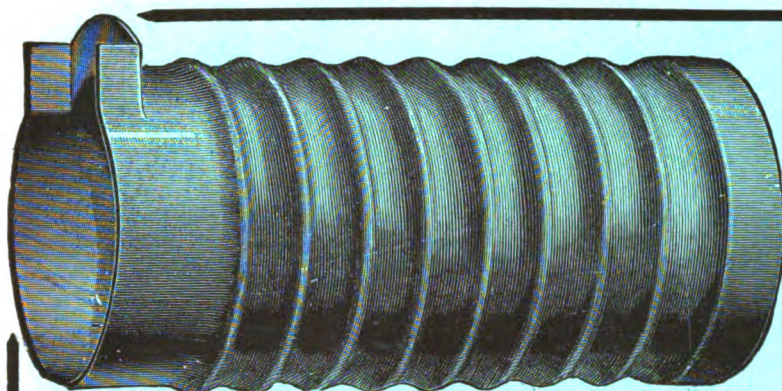
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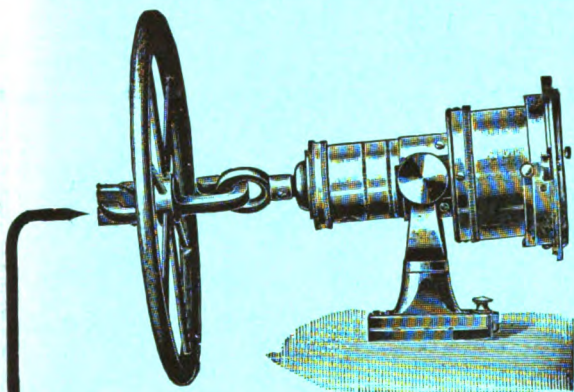
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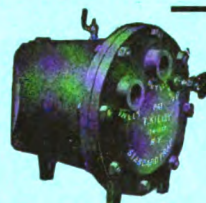
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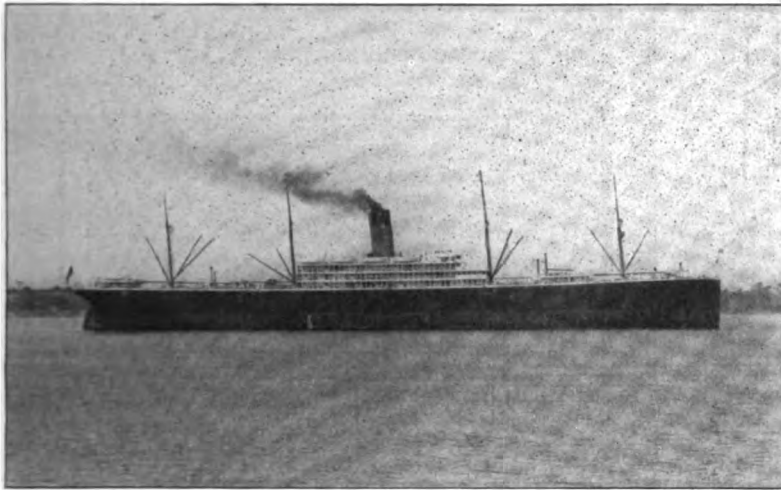
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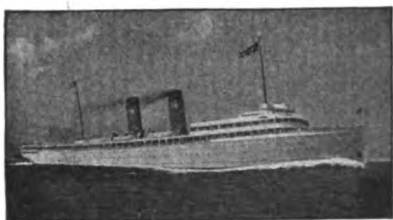
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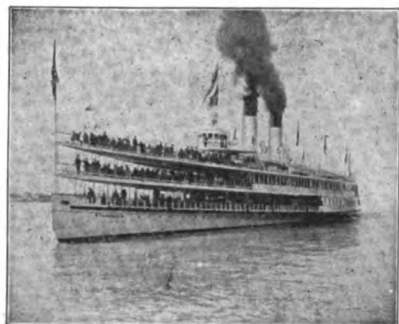
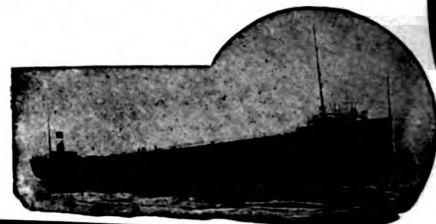
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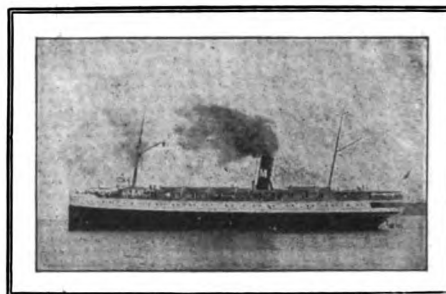
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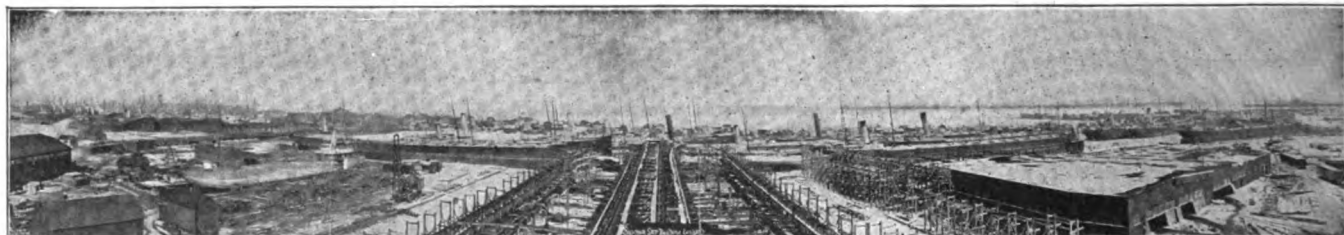


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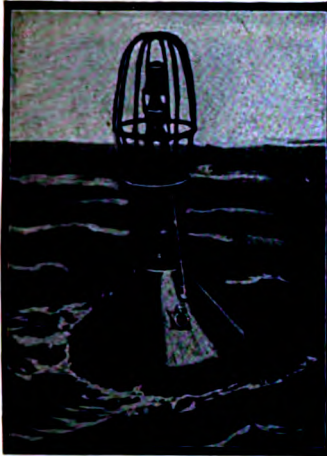
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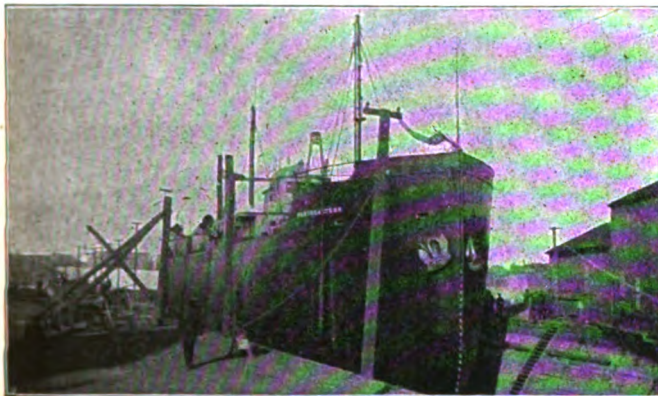
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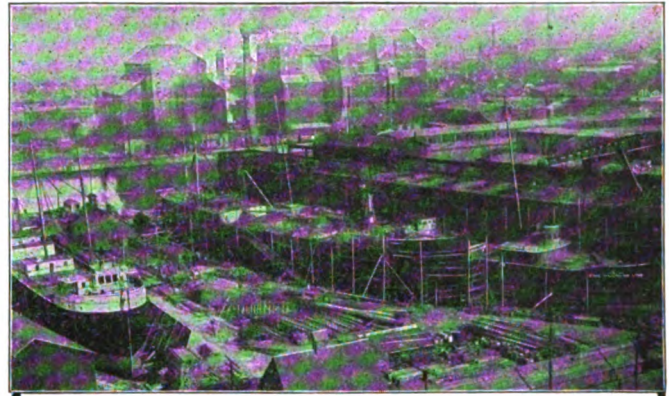
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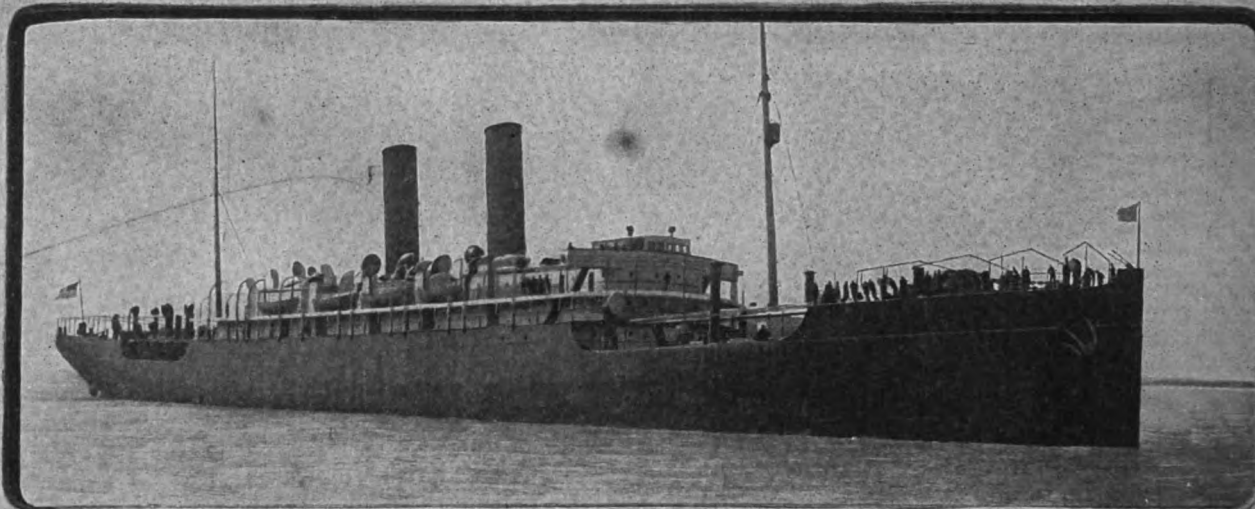
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Lighter Rescue,
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It is the one perfect injector for every type of steam boiler. It is almost as indispensable for the perfect operation of a boiler as the water which it feeds.

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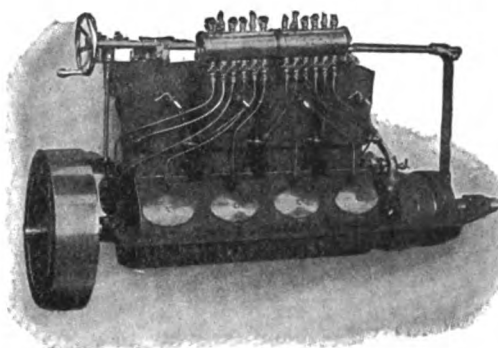
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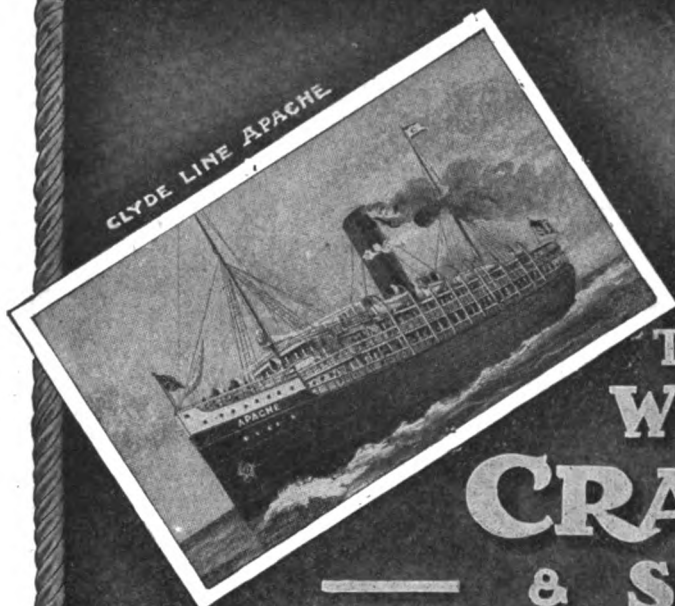
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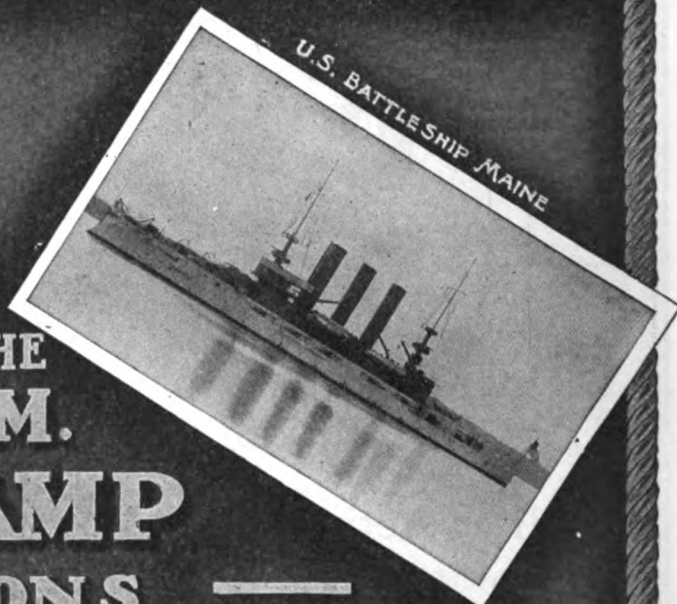
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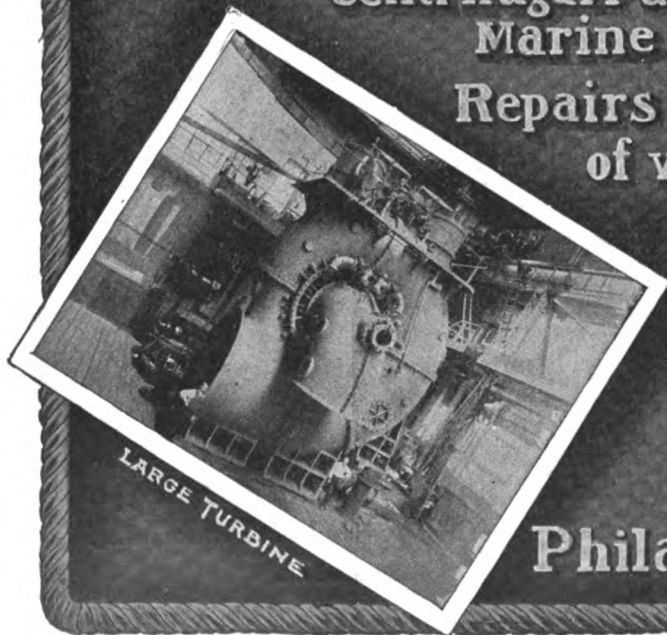


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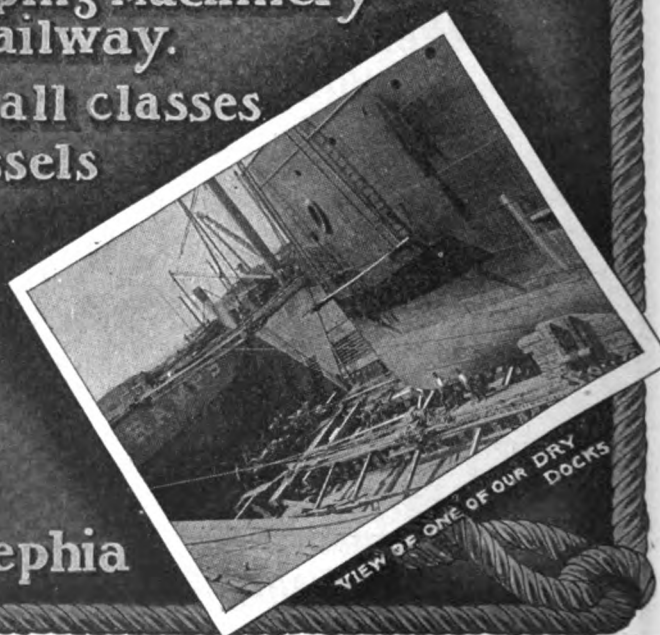
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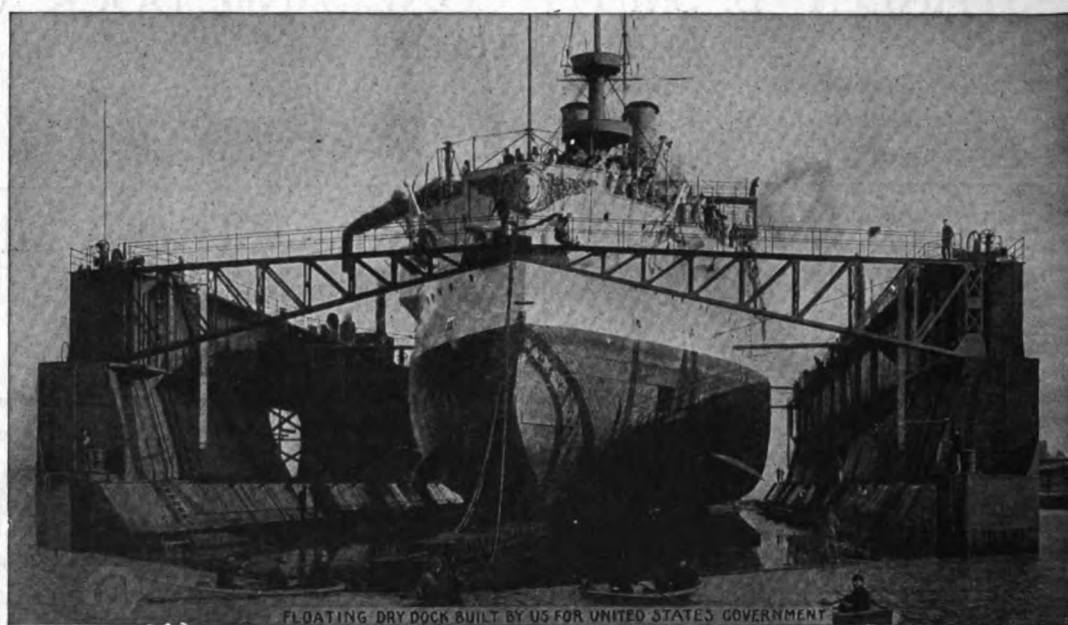
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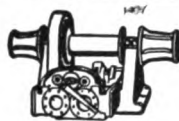


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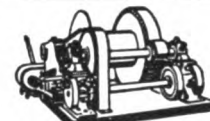
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THIS book relates in biographical form the development of the iron mines of the Lake Superior region.

Untold hardships were visited upon the pioneers in the iron country.

First of all, they tried to make iron in the upper peninsula of Michigan and failed; then they began carrying the ore in sleighs to the shore of Lake Superior and portaging it over the falls of St. Mary's river; every step was attended with difficulty and expense; then it proved refractory in the early blast furnaces of Pennsylvania and plunged them all in doubt as to its commercial value.

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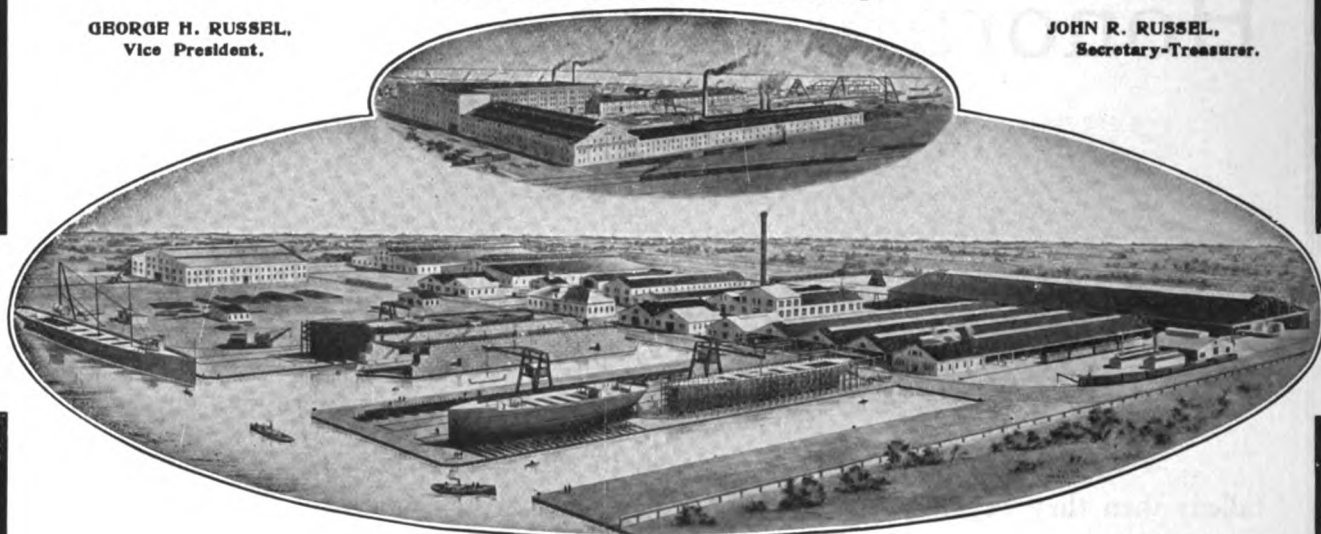
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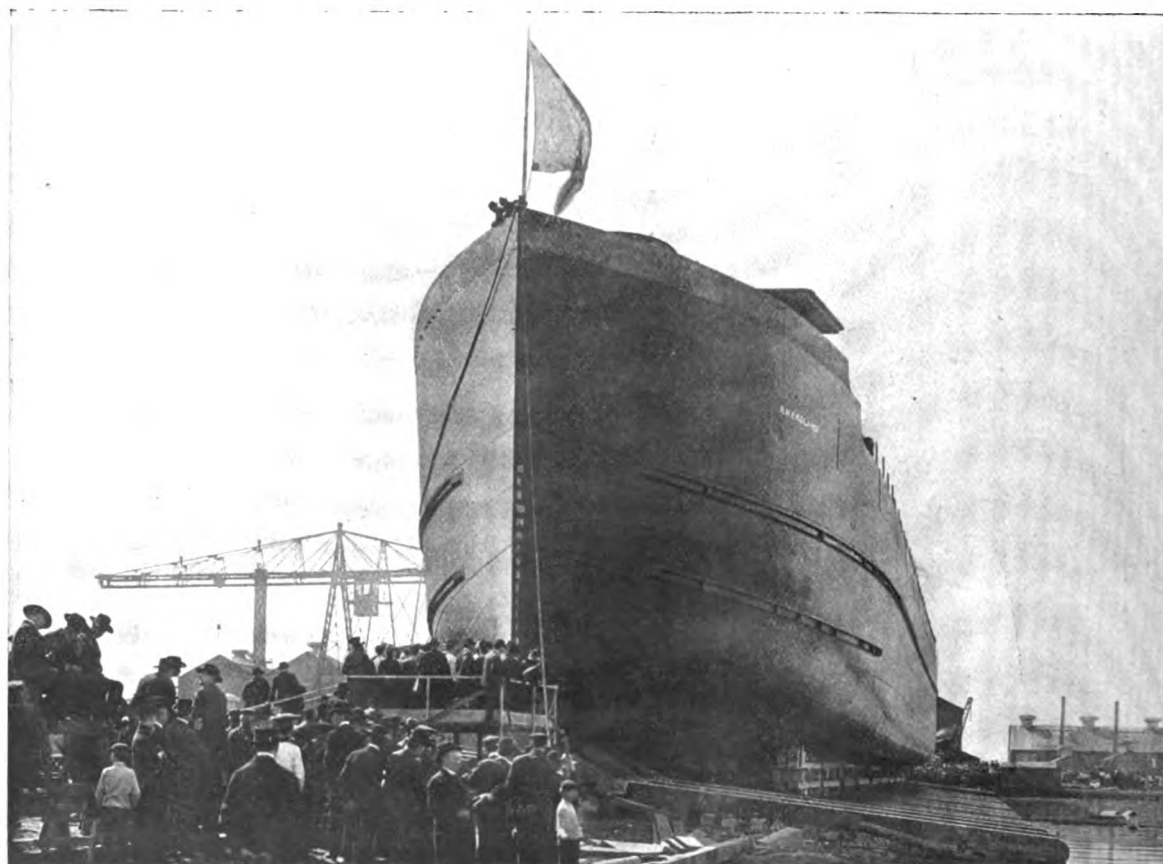
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Japanese Imperial Navy	-	-	-	-	-	-	-	-	122,700 "
Austrian Imperial Navy	-	-	-	-	-	-	-	-	56,700 "
Italian Royal Navy	-	-	-	-	-	-	-	-	32,500 "
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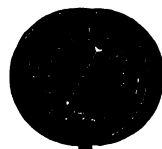
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See accompanying index of Advertisers for full addresses of concerns in this directory.

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WANTED and FOR SALE Department.**PROPOSALS.**

U. S. ENGINEER OFFICE, Grand Rapids, Mich., August 7, 1905. Sealed proposals for extension of West Breakwater at Petoskey, Mich., will be received here until 3 p. m., September 6, 1905, and then publicly opened. Information furnished on application. M. B. ADAMS, Col. Engrs. (Aug. 31.)

PROPOSALS for Dredging Pumps, etc., U. S. Engineer Office, Custom House, St. Louis, Mo., Aug. 9, 1905. Sealed proposals, in triplicate, for furnishing centrifugal dredging pumps, pulley-blocks, tie-beams, pipe lines and flexible joints will be received here until 12 noon, Sept. 8, 1905, and then publicly opened. Information furnished on application. THOS. L. CASEY, Major, Engrs. Aug 31

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For Sale.

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Photograph and price mailed on application. A. Garrison Foundry Co., Pittsburg, Pa.

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A steam barge, with capacity of about 250,000 M. lumber. P. P. Schnorbach, Muskegon, Mich.

Marine Boiler.

For Sale.—One 50 H. P. Scotch Marine Boiler, 10 ft. long, 78 in. diameter, 160 lbs. steam pressure. Manufactured by Ritter & Co., Buffalo, N. Y. In first-class shape. For particulars, write The Detroit Stove Works, Detroit, Mich. t. f.

FOR SALE**Fast Steam Yacht "Novia"**

Speed 22 miles per hour. (Formerly I. C. U. of Detroit.) Hull 57 ft long by 8 ft. beam. Dearing Boiler 300 lbs. pressure. Triple Expansion Engine. Turns a 31" Four Bladed Wheel 625 revolutions per minute. Everything in first class condition. Price \$3000 cash.

THE HARDY & DISCHINGER CO.
Toledo, Ohio.

FOR SALE.**For Sale.**

One marine boiler and engine for sale, suitable for steam barge. Address E. B. Johnson, Chaumont, N. Y.

For Sale.

Fore and aft Compound Marine Engine, size 6 x 12 x 6, and in perfect condition. Built by the Marine Iron Works, Chicago. Inquire of H. B. Larsen, Manistee, Mich.

Marine Gasoline Engine.

FOR SALE.—A 4-cylinder, 25-H. P. Leighton gasoline marine engine, with reversible propeller; perfect condition; slightly used; cost \$1,200; sell for \$500 cash. Box 577, Syracuse, N. Y.

For Sale, Cheap.

Second-hand boom-chains, all sizes, one thousand feet 6-in. tow-line, all in good condition. One new Snelling steerer. BAYFIELD TOWING CO., Bayfield, Wis. 8-24

FOR SALE \$3500.00.**The Steamer Gordon Campbell.**

Burned on spar-deck, forward only—easy to cut down to lumber barge, to carry million feet. Machinery, boilers and hull untouched and in good condition. Boat in dry dock and thoroughly overhauled last summer. Can be seen in Chicago. Address Room 613, 59 Dearborn St., Chicago. t f

WANTED.**Wanted.**

For freight service only, a boat 125 to 135 ft. long, 25 ft. beam, 5 to 6 ft. draught and speed ten miles per hour. Address C. J. Smith, Gen. Mgr. R. & O. Nav. Co., Montreal, Can.

Wanted.

Two barges, flat deck, about 120 x 30 feet. Address B. B. Jefferson, 30 N. Third St., Memphis, Tenn.

FOR SALE**The D. Robeson SHIP CHANDLERY BUSINESS at PORT HURON, MICH.**

Established 36 years. Does a large business in the sale of Cordage, Duck, Wire Rope, Blocks, Paints, Oils, Varnishes, Brushes; Roofing, Rubber Hose, Building Paper. Manufacturer of Sails, Flags, Tents and Awnings. Building is 40 x 70, two story brick, located close to boat landing. Ill health reason for disposing of real estate and business. For further particulars, write to

SCHOOLCRAFT & CO., Port Huron, Mich.

**For Sale**

Launch Factory and stock of engines and high grade hulls, finished and unfinished. One of the best factories in the country, with new machinery, good buildings, a fine testing tank, and excellent facilities for launching and shipping. Located above high water on the Ohio River. Frontage of ground, 250 ft., depth, 800 ft. Also a stock of fine launches 18 to 30 ft. long, lumber and other material. This property must be sold. Stockholders are engaged in other business and can not give it attention. With proper management and attention a fine business can be established. Write for particulars, or come and see the plant.

Neptune Launch & Mfg. Co.

Evansville,

Indiana.

Buyers' Directory of the Marine Trade.—Continued.

ENGINE BUILDERS, MARINE.

American Ship Building Co.....Cleveland.
 Atlantic Works.....East Boston, Mass.
 Chicago Ship Building Co.....Chicago.
 Chase Machine Co.....Philadelphia.
 Cramp, Wm. & Sons.....Toledo, O.
 Craig Ship Building Co.....Detroit.
 Detroit Ship Building Co.....Hoboken, N. J.
 Fletcher, W. & A. Co.....Quincy, Mass.
 Fore River Shipbuilding Co.....Detroit, Mich.
 Great Lakes Engineering Works.....Philadelphia.
 Hall Bros.....East Boston, Mass.
 Lockwood Mfg. Co.....Chicago.
 Maryland Steel Co.....Sparrows Point, Md.
 Mietz, Aug.....New York.
 Milwaukee Dry Dock Co.....Milwaukee.
 Mosher, Chas. D.....New York.
 Moulton Steering Engine Co.....New York.
 Newport News Ship Building Co.....Newport News, Va.
 New York Shipbuilding Co.....Camden, N. J.
 Northwestern Steam Boiler & Mfg. Co.....Duluth, Mich.
 Quintard Iron Works Co.....New York.
 Roach's Ship Yard.....Chester, Pa.
 Sheriffs Mfg. Co.....Milwaukee.
 Superior Ship Building Co.....Superior, Wis.
 Thropp, J. E. & Sons Co.....Trenton, N. J.
 Trout, H. G.....Buffalo.

ENGINE ROOM TELEGRAPH, CALL BELLS, ETC.

Cory, Chas. & Son.....New York.
 Marine Mfg. Supply Co.....New York.

ENGINE TESTING.

Parsons, Ralph M.....Chicago.

ENGINEERING SPECIALTIES AND SUPPLIES.

Crane Co.....Chicago.
 Kieley & Mueller.....New York.
 Lunkenheimer Co.....Cincinnati.
 Northwestern Steam Boiler & Mfg. Co.....Duluth, Minn.

ENGINEERS, MARINE, MECHANICAL, CONSULTING.

Hynd, Alexander.....Cleveland.
 Hunt, Robt. W. & Co.....Chicago.
 Kidd, Joseph.....Duluth, Minn.
 Mosher, Chas. D.....New York.
 Nacey, James.....Cleveland.
 Roelker, H. B.....New York.
 Wood, W. J.....Chicago.

FANS FOR VENTILATION, EXHAUST, ETC.

Sturtevant, B. F. Co.....Hyde Park, Mass.

FEED WATER PURIFIERS AND HEATERS.

Greacen-Derby Engineering Co.....Perth Amboy, N. J.
 Ross Valve Co.....Troy, N. Y.

FIRE EXTINGUISHERS.

Safety Fire Extinguisher Co.....New York.

FIXTURES FOR LAMPS, OIL OR ELECTRIC.

General Electric Co.....Schenectady, N. Y.

FORGES.

Sturtevant, B. F. Co.....Boston.
 Sutton Co., C. E.....Toledo, O.

FORGINGS FOR CRANK, PROPELLER OR THRUST SHAFTS, ETC.

Cleveland City Forge & Iron Co.....Cleveland.
 Fore River Shipbuilding Co.....Quincy, Mass.
 Macbeth Iron Co.....Cleveland.

FLUE WELDING.

Fix's, S. Sons.....Cleveland.

FUEL ECONOMIZERS.

Sturtevant Co., B. F.....Hyde Park, Mass.

FUELING COMPANIES AND COAL DEALERS.

Hanna, M. A. & Co.....Cleveland.
 Ironville Dock & Coal Co.....Toledo, O.
 Parker Bros. Co., Ltd.....Detroit.
 Pickands, Mather & Co.....Cleveland.
 Pittsburgh Coal Co.....Cleveland.
 Smith, Stanley B., & Co.....Detroit.
 Smith Coal & Dock Co., Stanley B. Toledo, O.

FUELING PLANTS, BUILDERS OF

Link Belt Machinery Co.....Chicago.

FURNACES FOR BOILERS.

Continental Iron Works.....New York.

GAS BUOYS.

Safety Car Heating & Lighting Co..New York.

GAS AND GASOLINE ENGINES.

Chase Machine Co.....Cleveland.

GAUGES, STEAM AND VACUUM.

Ashton Valve Co.....Boston.
 Lunkenheimer Co.....Cincinnati.

GAUGES, WATER.

Bonner Co., Wm. T.....Boston.
 Lunkenheimer Co.....Cincinnati, O.

GRAPHITE.

Dixon Crucible Co., Joseph..Jersey City, N. J.

GREASE EXTRACTORS.

Greacen-Derby Engineering Co.....Perth Amboy, N. J.

HAMMERS, STEAM.

Chase Machine Co.....Cleveland.

HEATING APPARATUS.

Sturtevant, B. F. Co.....Hyde Park, Mass.
 Sutton Co., C. E.....Toledo, O.

HOISTS FOR CARGO, ETC.

American Ship Building Co.....Cleveland.
 Brown Hoisting Machinery Co. (Inc.).....Cleveland.
 Chase Machine Co.....Cleveland.
 General Electric Co.....New York.
 Georgian Bay Engineering Works.....Midland, Ont.
 Hyde Windlass Co.....Bath, Me.
 McMyler Mfg. Co.....Cleveland.
 Marine Iron Co.....Bay City.
 Mietz, Aug.....New York.

HOLLOW SHAFTINGS, IRON OR STEEL.

Falls Hollow Staybolt Co..Cuyahoga Falls, O.

HOLLOW STAYBOLT IRON.

Falls Hollow Staybolt Co..Cuyahoga Falls, O.

HYDRAULIC DREDGES.

Great Lakes Engineering Works.....Detroit.

HYDRAULIC TOOLS.

Watson-Stillman Co., The.....New York.

ICE MACHINERY.

Great Lakes Engineering Works.....Detroit.
 Roelker, H. B.....New York.

INDICATORS FOR STEAM ENGINES.

Ashton Valve Co.....Boston.

INJECTORS.

American Injector Co.....Detroit.
 Crane Co.....Chicago.
 Jenkins Bros.....New York.
 Lunkenheimer Co.....Cincinnati.
 Penberthy Injector Co.....Detroit, Mich.

INSURANCE, MARINE.

Elphicke, C. W. & Co.....Chicago.
 Fleming & Co., E. J.....Chicago.
 Gilchrist & Co., C. P.....Cleveland.
 Hawgood & Co., W. A.....Cleveland.
 Helm & Co., D. T.....Duluth.
 Hutchinson & Co.....Cleveland.
 McCarthy, T. R.....Montreal.
 McCurdy, Geo. L.....Chicago.
 Mitchell & Co.....Cleveland.
 Parker Bros. Co., Ltd.....Detroit.
 Peck, Chas. E. & W. F. New York & Chicago.
 Prindiville & Co.....Chicago.
 Richardson, W. C.....Cleveland.
 Sullivan, D. & Co.....Chicago.

IRON CASTINGS.

Sutton Co., C. E.....Toledo, O.

IRON ORE AND PIG IRON.

Bourne-Fuller Co.....Cleveland, O.
 Hanna, M. A. & Co.....Cleveland.
 Pickands, Mather & Co.....Cleveland.

LAUNCHES—STEAM, NAPHTHA, ELECTRIC.

Marine Iron Works.....Chicago.
 Truscott Boat Mfg. Co.....St. Joseph, Mich.

LIFE PRESERVERS, LIFE BOATS, BUOYS.

Armstrong, Cork Co.....Pittsburg.
 Drein, Thos. & Son.....Wilmington, Del.
 Gaynor, T. F.....New York.
 Kahnweiler's Sons, D.....New York.
 National Cork Co.....Brooklyn.

LIGHTS, SIDE AND SIGNAL.

Russell & Watson.....Buffalo.

LOGS.

Nicholson Ship Log Co.....Cleveland.
 Walker & Sons, Thomas.....Birmingham, Eng.
 Also Ship Chandlers.

LUBRICATING GRAPHITE.

Dixon Crucible Co., Joseph..Jersey City, N. J.

LUBRICATORS.

Crane Co.....Chicago.
 Lunkenheimer Co.....Cincinnati.

LUMBER.

Martin-Barriss Co.....Cleveland.
 Rayner, J.....Chicago.

MACHINISTS.

Chase Machine Co.....Cleveland.
 Hickler Bros.....Sault Ste. Marie, Mich.
 Lockwood Mfg. Co.....East Boston, Mass.

MACHINE TOOLS (WOOD WORKING).

Atlantic Works, Inc.....Philadelphia.

MARINE RAILWAYS.

Hickler Bros.....Sault Ste. Marie, Mich.

MARINE RAILWAYS, BUILDERS OF.

Crandall & Son, H. I.....East Boston, Mass.

MATTRESSES, CUSHIONS, BEDDING.

Fogg, M. W.....New York.

MECHANICAL DRAFT FOR BOILERS.

American Ship Building Co.....Cleveland.
 Detroit Ship Building Co.....Detroit.
 Great Lakes Engineering Works.....Detroit.
 Sturtevant, B. F. Co.....Hyde Park, Mass.

METALLIC PACKING.

Katzenstein, L. & Co.....New York.

MOTORS, GENERATORS—ELECTRIC.

Fisher Electrical Works.....Detroit.
 General Electric Co.....Schenectady, N. Y.
 Sturtevant, B. F. Co.....Hyde Park, Mass.

NAUTICAL INSTRUMENTS.

Ritchie, E. S., & Sons.....Brookline, Mass.

NAVAL ARCHITECTS.

Hynd, Alexander.....Cleveland.
 Kidd, Joseph.....Duluth, Minn.
 Mosher, Chas. D.....New York.
 Nacey, James.....Cleveland.
 Wood, W. J.....Chicago.

OAKUM.

Stratford, Oakum Co.....Jersey City, N. J.

OIL ENGINES.

Mietz, Aug.....New York.

OILS AND LUBRICANTS.

Dixon Crucible Co., Joseph..Jersey City, N. J.
 Standard Oil Co.....Cleveland.

PACKING.

Crane Co.....Chicago.
 Jenkins Bros.....New York.
 Katzenstein, L. & Co.....New York.

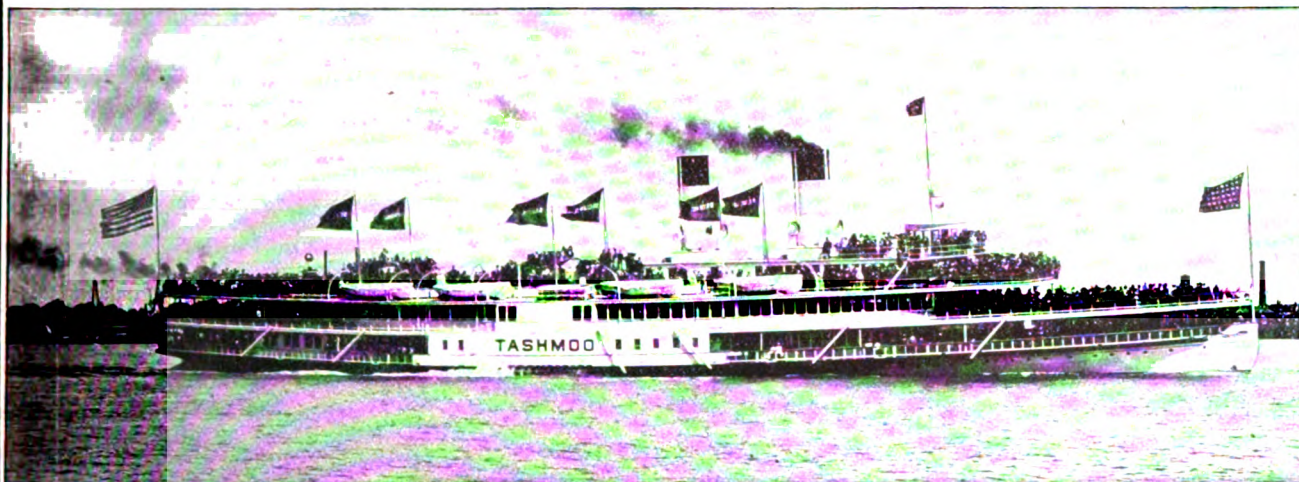
PAINTS.

Baker, Howard H. & Co.....Buffalo.
 Upson-Walton Co.....Cleveland.

PATTERN SHOP MACHINERY.

Atlantic Works, Inc.....Philadelphia.

Beautiful Marine Views



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Photographs of Great Lakes Vessels.

Photographs of Marine Scenes on the Great Lakes.

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Angeline, Spar Dock. (Size 10x13—Price \$1.50.)
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Arzyle. (Thousand Islands).
James Battle. (Detroit Fire Boat).
On the ways.
James Battle. (Detroit Fire Boat).
The launch.
Castalin.
Chicago.
Chippewa. (Canadian).
Chippewa. (American).
City of Alpena.
City of Bangor.
City of Erie at Buffalo Docks.
City of Erie.
Columbia. (On the Ways—Three Views).
Columbia.
Conemaugh.
Coralia, loading at Escanaba Ore Dock. (Size 15x21—Price \$2.00).
Corisca.
Corona.
John Craig.
Detroit in the Ice. (Transfer Steamer). Two Views.
M. M. Drake.
Eastern States. (Launch).
Eastern States on First Trip. (Three Views—Broadside, Bow and Stern).
Eastern States. (On the Ways—Three Views).
Isaac L. Ellwood.
Excelsior. (Detroit Ferry).
Fairbairn.
H. C. Frick.
Garland. (Detroit Ferry).
Glidden—Wreck of, in St. Clair Ship Canal.
Greyhound.
Hanna, M. A.
Harlem.
Harvard. (On the Ways).
Harvard. (The Launch).
Harvard. (In the Slip—Two Views).
Helena.
Hennepin.
Holley, Alexander (Whaleback tow-barge).
India.
Islander. (Thousand Islands—Three Views).
Frank E. Kirby at Put-in-Bay.
Lagonda discharging coal at docks.
Lackawanna.
Mahoning.
Manitou.
Majestic. (Three Views).
Michigan Central in Detroit River. (Winter).
Mohawk.
Montana.
W. B. Morley, wreck in Detroit River, Aug. 6, 1890.
Simon J. Murphy. (On the Ways).

Simon J. Murphy. (On the Ways—Two Views).
Simon J. Murphy, Launch. (Bow in Slip. Stern not yet in Water.)
Neshoto.
New Island Wanderer. (Thousand Islands).
New York. (Thousand Islands—Two Views).
North King. (Thousand Islands).
North Land.
North Land, in the "Soo" Locks.
North Land, at Mackinac Island. (Two Views).
North Land at the Docks, Mackinac.
North Land and North West in Winter Quarters.
North West.
Onglana. (Two Views).
Ontario, in the Ice. (Transfer Steamer).
Pathfinder, in the Locks.
Peerless, at Mackinac Island.
Pere Marquette No. 17.
Plankinton at Northwestern Coal Docks, Duluth.
Pleasure, at Dock (Detroit Ferry).
E. C. Pope.
Princeton.
Ramapo.
W. D. Rees.
Rensselaer.
Rube Richards, in Ship Canal at Duluth.
St. Lawrence (Thousand Islands).
Ste. Marie, in Mackinac Straits.
Howard L. Shaw. (On the Ways—Three Views).
Howard L. Shaw. (The Launch).
Howard L. Shaw. (In the Slip).
Sir William Siemens.
George Stone.
Superior. (Steel Trust Tender).
Tashmoo. (In Dewey Naval Parade, Detroit River).
Tashmoo, June 9, 1900.
Tashmoo. (Entering St. Clair Flats Ship Canal).
Tashmoo. (Landing at Star Island—Two Views).
Thompson, A. D. (Whaleback).
Toronto. (Thousand Islands).
Toronto. (Thousand Islands—at Alexandria Bay).
Toronto. (Thousand Islands—at Gananoque).
Transport, in Detroit River, Winter. (Car Ferry—Two Views).
Troy.
Uganda, in Ship Canal at Duluth.
United Empire.
Capt. Visger. (Thousand Islands).
Watt, loading at S. S. Ry. Ore Docks, Marquette.
Wells, Frederic B.
E. P. Wilbur.
Western States. (Size 10x13—Price \$1.50).
Yosemite.

ASHTABULA, OHIO.

Harbor Entrance.
L. S. & M. S. Ry. Ore Docks.
L. S. & M. S. Ry. Ore Docks—unloading ore.
L. S. & M. S. Ry. Ore Docks—ore on docks.
Car Dumping Machine—two views.
Fueling Lighter with Clam Shell Hoist.

BUFFALO, N. Y.

Harbor Entrance.
City Ship Canal.
Great Northern Elevator and Shipping.
Great Northern Elevator—unloading grain.
River and Elevators.
River and Elevators, foot of Michigan St.
River and Elevators, foot of Main St.
C. & B. Line Freight Sheds.
Northern Steamship Co.'s Winter Quarters.
"An Old Timer" at C. T. T. Elevator.
Lackawanna Coal Chutes, two views.
Lackawanna Ore Docks—unloading ore.
Lackawanna Ore Docks—unloading ore and loading coal.
Unloading Ore from Whaleback, two views.
Unloading Wheat into Elevators, two views.

CHICAGO, ILL.

Chicago River Elevators.
Lake Front, from Illinois Central Station.
Illinois Steel Works and Harbor Entrance, South Chicago.

CLEVELAND, O.

Cleveland Harbor from Lake View Park.
American Steel & Wire Co.'s Plant—7x17 inches, Price \$1.75.
Ellsworth Coal Chutes—Dumping Car, two views.
Cleveland & Pittsburg Ore Docks, two views.
Ore Docks and Harbor, two views—7x17 inches, Price \$1.75.
Unloading Ore, two views.
Globe Iron Works Ship Yard.
Globe Iron Works Ship Yard, Laying Keel of No. 400.

CONNEAUT, O.

Harbor Entrance.
Unloading Ore—Brown Conveying Hoists, two views.
Unloading Ore—Clam Shell Plant.
Car Dumping Plant, two views.

DETROIT, MICH.

Water Front, Detroit, from Windsor—7x17 inches, Price \$1.75.
Winter in Detroit River.
Car Ferry Turning in Ice, two views.
"Michigan Central" Entering Slip.
Old Timers on the Detroit River.
Crossing Detroit River in Winter.

DULUTH, MINN.

Great Northern Elevator.
Peavey Elevator.
Ship Canal (Looking in) two views.
Ship Canal (Looking out).
Flour Mills.
Northwestern Coal Docks.
Philadelphia & Reading Coal Docks.
The Harbor.
The Bluffs.
"Last Trip from Duluth."

ERIE, PA.

Anchor Line Docks and Pennsylvania R. R. Co.'s Ore and Coal Docks.
Pennsylvania R. R. Coal Trestle.
Pennsylvania R. R. Co.'s Docks, Unloading Ore.
Hanna's Ore Plant.
Coal Trestle and Car Dumping Plant.

OSWEGO, N. Y.

Coal and Ore Docks. Panoramic View, 7x17 inches, Price \$1.75.

ST. CLAIR FLATS.

Str. Tashmoo Entering Ship Canal.
A Freighter Leaving Ship Canal.
Lake Vessels Old and New.
Nightfall on the River.
A Lumber Tow.

MARQUETTE, MICH.

Str. James Watt Loading at S. S. Ry. Ore Docks.
Presque Isle Ore Docks.
Light House Point.
Steamer Lagonda discharging coal at S. S. Ry. Coal Docks.
Steamers at the S. S. Ry. Ore Docks.

MACKINAC, MICH.

Str. North Land at the Dock.

SAULT STE. MARIE, MICH.

Locking a Big Steamer.
Locks showing high and low level.
The Locks.
General View of Locks from Offices.
Poe Lock, from below, closed.
Poe Lock, from below, open.
Poe Lock, from above.
Poe Lock, with Whaleback.
Whaleback Str. Pathfinder in the Locks.
St. Marys River, South from the Locks.
Weitzel Lock, from above.
Weitzel Lock, from below.
Str. North Land Passing Locks, two views.
Upper Entrance to Lock Canal.
Gate Mechanism.
Interior of Power House.
Canadian Lock from Upper End.
Canadian Lock from Lower End.
Steamers Entering and Leaving Poe Locks.
The Rapids, looking up.
The Rapids, looking across.
Indians fishing in the rapids.

FOR SALE BY

The Marine Review, Cleveland.

Buyers' Directory of the Marine Trade.—Continued.

PILE DRIVING AND SUBMARINE WORK.

Buffalo Dredging Co.....Buffalo.
 Dunbar & Sullivan Dredging Co.....Buffalo.
 Fitz-Simons & Connell Co.....Chicago.
 Great Lakes Dredge & Dock Co.....Chicago.
 Hickler Bros.....Sault Ste. Marie, Mich.
 Lake Superior Contracting & Dredging Co.
Duluth, Minn.
 Parker Bros. Co., Ltd.....Detroit.
 Smith Co., L. P. & J. A.....Cleveland.
 Starke Dredge & Dock Co., C. H.....Milwaukee.
 Sullivan, M.....Detroit

PIPE, WROUGHT IRON.

Bourne-Fuller Co.....Cleveland, O.
 Crane Co.....Chicago.
 Macbeth Iron Co.....Cleveland.
 Reading Iron Co.....Reading, Pa.

PLANING MILL MACHINERY.

Atlantic Works, Inc.....Philadelphia.

PLATES—SHIP, STRUCTURAL, ETC.

Bourne-Fuller Co.....Cleveland, O.
 Otis Steel Co.....Cleveland.

PRESSURE REGULATORS.

Kieley & Mueller.....New York.
 Ross Valve Co.....Troy, N. Y.

PROPELLER WHEELS.

American Ship Building Co.....Cleveland.
 Atlantic Works.....East Boston, Mass.
 Cramp, Wm. & Sons.....Philadelphia.
 Detroit Ship Building Co.....Detroit.
 Fore River Shipbuilding Co.....Quincy, Mass.
 Great Lakes Engineering Works.....Detroit.
 Hyde Windlass Co.....Bath, Me.
 Lockwood Mfg. Co.....East Boston, Mass.
 Marine Iron Works.....Chicago.
 Milwaukee Dry Dock Co.....Milwaukee.
 Newport News Ship Building Co.....Newport News, Va.
 Roelker, H. B.....New York.
 Sheriffs Mfg. Co.....Milwaukee.
 Superior Ship Building Co.....Superior, Wis.
 Thropp & Sons Co., J. E.....Trenton, N. J.
 Trout, H. G.....Buffalo.

PROJECTORS, ELECTRIC.

General Electric Co.....Schenectady, N. Y.

PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F., Mfg. Co.....New York.
 Great Lakes Engineering Works.....Detroit.
 Marine Iron Works.....Chicago.
 Kingsford Foundry & Machine Works.....Oswego, N. Y.

PUNCHES AND SHEARS.

Sutton Co., C. E.....Toledo, O.

RANGES.

Stamford Foundry Co.....Stamford, Conn.

REFRIGERATING APPARATUS.

Great Lakes Engineering Works.....Detroit.
 Roelker, H. B.....New York.

REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register.....Cleveland.

RIVETS, STEEL FOR SHIPS AND BOILERS.

Bourne-Fuller Co.....Cleveland, O.

SAFETY VALVES.

Ashton Valve Co.....Boston.
 Crane Co.....Chicago.
 Lunkenheimer Co.....Cincinnati.

SAIL MAKERS.

Baker, Howard H. & Co.....Buffalo.
 Upson-Walton Co.....Cleveland.

SALVAGE COMPANIES.

See Wrecking Companies.

SEARCH LIGHTS.

General Electric Co.....Schenectady, N. Y.

SHAFTING, HOLLOW.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

SHEARS.

See Punches, and Shears.

SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co.....Cleveland, O.
 Otis Steel Co.....Cleveland.

SHIP BUILDERS.

American Ship Building Co.....Cleveland.
 Atlantic Works.....East Boston, Mass.
 Buffalo Dry Dock Co.....Buffalo.
 Cramp, Wm. & Sons.....Philadelphia.
 Craig Ship Building Co.....Toledo, O.
 Chicago Ship Building Co.....Chicago.
 Detroit Ship Building Co.....Detroit.
 Fore River Shipbuilding Co.....Quincy, Mass.
 Great Lakes Engineering Works.....Detroit.
 Lockwood Mfg. Co.....East Boston, Mass.
 Maryland Steel Co.....Sparrows Point, Md.
 Milwaukee Dry Dock Co.....Milwaukee.
 Newport News Ship Building Co.....Newport News, Va.

New York Shipbuilding Co.....Camden, N. J.
 Roach's Ship Yard.....Chester, Pa.
 Shipowner's Dry Dock Co.....Chicago.
 Smith & Son, Abram.....Algonac, Mich.

SHIP CHANDLERS.

Baker, Howard H. & Co.....Buffalo.
 Marine Mfg. & Supply Co.....New York.
 Upson-Walton Co.....Cleveland.

SHIP DESIGNERS.

Kidd, Joseph.....Duluth.
 Steel, Nacey & Hynd.....Cleveland.
 Wood, W. J.....Chicago.

SHIP LANTERNS AND LAMPS.

Russell & Watson.....Buffalo.

SHIPMATE RANGES.

Stamford Foundry Co.....Stamford, Conn.

SHIP TIMBER.

Martin-Barriss Co.....Cleveland.
 Rayner, J.....Chicago.

SMOOTH-ON COMPOUND, FOR REPAIRS.

Smooth-On Mfg. Co.....Jersey City, N. J.

STAYBOLT IRON OR STEEL BARS, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSELS FOR SALE.

Gilchrist & Co., C. P.....Cleveland.
 Holmes, Samuel.....New York.
 Lester, S. S.....Quebec, Can.
 McCarthy, T. R.....Montreal, Can.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line.....New York.
 Anchor Line.....Buffalo.
 Boston Steamship Co.....Boston.
 Cleveland & Buffalo Transit Co.....Cleveland.
 International Mercantile Marine Co.....Philadelphia.
 Mallory Line.....New York.
 Merchants' Montreal Line.....Montreal.
 New York & Cuba Mail S. S. Co.....New York.
 Red Star Line.....New York.
 United Fruit Co.....Boston.

STEEL CASTINGS.

Otis Steel Co.....Cleveland.
 Sutton Co., C. E.....Toledo, O.

STEERING APPARATUS.

American Ship Building Co.....Cleveland.
 Chase Machine Co.....Cleveland.
 Detroit Ship Building Co.....Detroit.
 Hyde Windlass Co.....Bath, Me.
 Marine Mfg. & Supply Co.....New York.
 Moulton Steering Engine Co.....New York.
 Sheriffs Mfg. Co.....Milwaukee.

SUBMARINE DIVING APPARATUS.

Morse & Son, A. J.....Boston.
 Schrader's Son, Inc., A.....New York.

SURVEYORS, MARINE.

Gaskin, Edward.....Buffalo.
 Hynd, Alexander.....Cleveland.
 Parker Bros. Co., Ltd.....Detroit.
 Nacey, James.....Cleveland.
 Steel, Adam.....Cleveland.
 Wood, W. J.....Chicago.

TESTS OF MATERIALS.

Hunt, Robert W. & Co.....Chicago.
 Lunkenheimer Co.....Cincinnati, O.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Watson-Stillman Co.....New York.

TOOLS, WOOD WORKING.

Atlantic Works, Inc.....Philadelphia.

TOWING MACHINES.

American Ship Windlass Co., Providence, R. I.
 Chase Machine Co.....Cleveland.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co.....Kingston, Ont.
 Great Lakes Towing Co.....Cleveland.

TRAPS, STEAM.

Kieley & Mueller.....New York.
 Sturtevant Co., B. F.....Hyde Park, Mass.

TRUCKS.

Boston & Lockport Block Co.....Boston.

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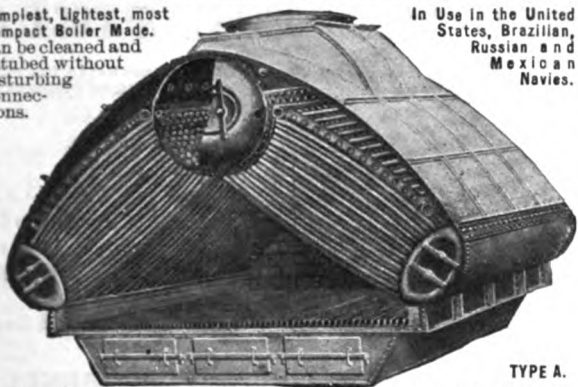
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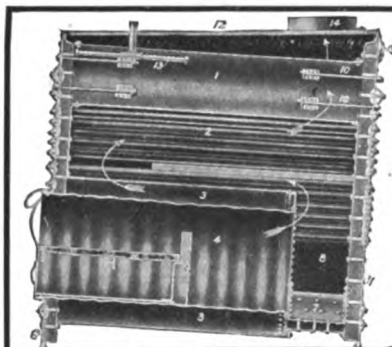
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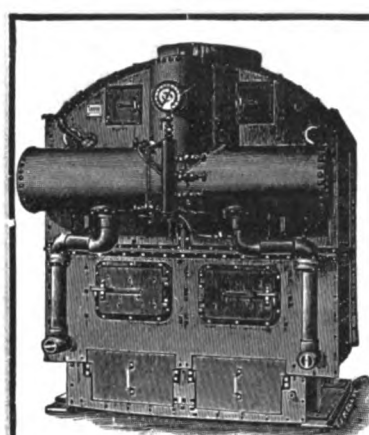


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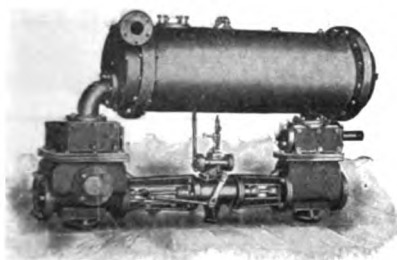
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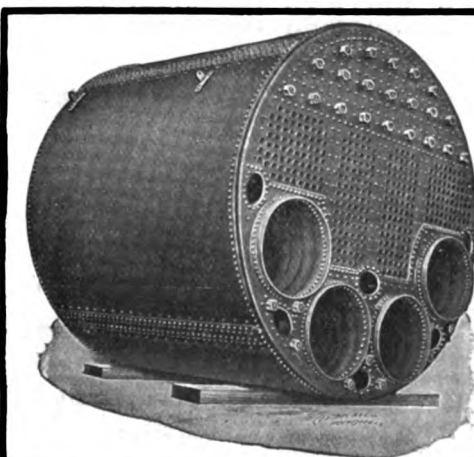
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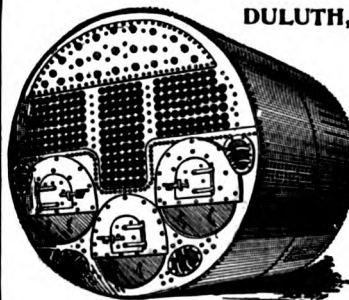
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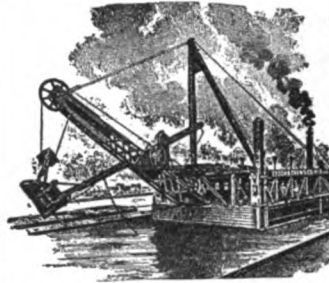
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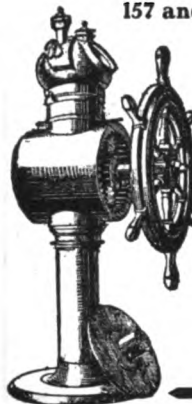
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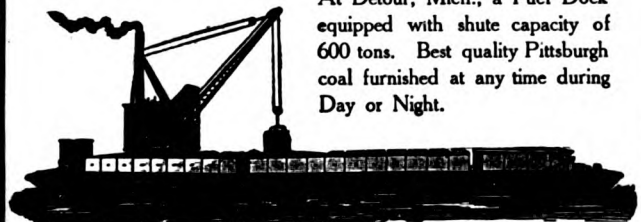
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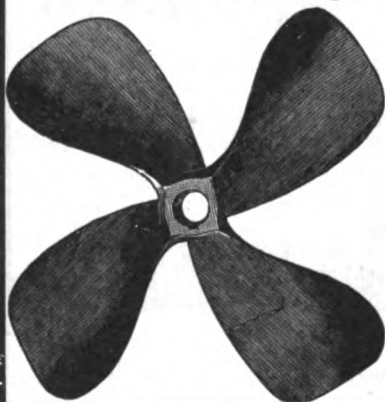
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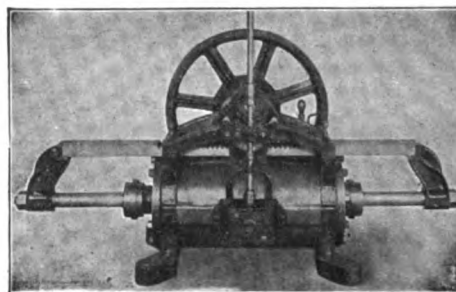
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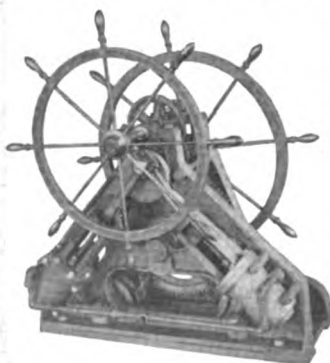
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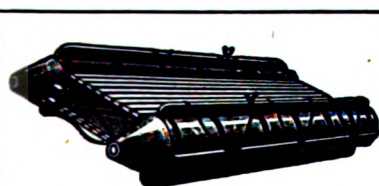
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American Injector Co. 3	Elphicke, C. W. & Co. 46	Link Belt Machinery Co. †	Red Star Line. 45
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American Ship Building Co. 4	Fitz-Simons & Connell Co. 42	"Long Arm" System Co. †	Ritchie & Sons, E. S. *
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Armstrong Cork Co. 52	Fleming & Co., E. J. 46	Lunkenheimer Co. 11	Boiler Co. 11
Ashton Valve Co. 35	Fletcher Co., W. & A. 48		Roelker, H. B. 50
Atlantic Works 48	Fogg, M. W. 50		Ross Valve Co. 50
Atlantic Works, Inc. †	Fore River Shipbuilding Co. 48		
Balcock & Wilcox Co. 7	Gaynor, T. F. 47	McCarthy, T. R. 46	
Baker, Howard H. & Co. 52	General Electric Co. 52	McCurdy, Geo. L. 35	
Bake, Geo. F., Mfg. Co. 50	Gilchrist, Albert J. 46	McMyler Mfg. Co. 43	Safety Car Heating & Lighting
Belcher, Fred P. 47	Gilchrist & Co., C. P. 46	MacDonald, Ray G. 46	Co. 5
Beland, J. J. 46	Gould, Holding & Maston 46	Mallory Line. 45	Safety Fire Extinguisher Co. 47
Bonner & Co., Wm. T. †	Great Lakes Dredge & Dock Co. 42	Marine Iron Co., Bay City, Mich. 47	Scherzer Rolling Lift Bridge Co. 44
Boston & Lockport Block Co. *	Great Lakes Engineering Works 14	Marine Iron Works 8	Schrader's Son, A. 50
Boston Steamship Co. 45	Great Lakes Register. 7	Marine Mfg. & Supply Co. 43	Shaw, Warren, Cady & Oakes. 46
Bourne-Fuller Co. 35	Great Lakes Towing Co. 7	Martin-Barriss Co. 48	Shelby Steel Tube Co. 5
Bowers, L. M. & Co. 41	Greacen-Derby Engineering Co. †	Maryland Steel Co. 10	Sheriffs Mfg. Co. 44
Breymann & Bros., G. H. 42		Mayo & Bailey *	Shipping World. *
Brown Hoisting Machinery Co.,	Hall, John B. 46	Merchants' Montreal Line. 44	Shipowners' Dry Dock Co. 50
Inc. 2	Hanna & Co., M. A. 43	Mietz, Aug. †	Smith Co., L. P. & J. A. 42
Buffalo Dredging Co. 42	Hawgood & Co., W. A. 46	Milwaukee Dry Dock Co. 5	Smith Coal & Dock Co., Stanley B. 9
Buffalo Dry Dock Co. 5	Helm & Co., D. T. 46	Mitchell & Co. 46	Smith, Stanley B., & Co. 9
Bunker, Edw. A. 51	Hickler Bros. 42	Morse & Son, A. J. 50	Smooth-On Mfg. Co. 51
	Holmes, Samuel. 46	Mosher Water-Tube Boiler Co. 41	Standard Oil Co. *
Carroll Wm. F. 46	Hoyt, Dustin & Kelley. 46	Moulton Steering Engine Co. 44	Starke Dredge & Dock Co., C. H. 43
Chase Machine Co. 11	Hunt & Co., Robert W. 47		Stirling Co. 11
Chicago Ship Building Co. 4	Hutchinson & Co. 46	Nacey & Hynd. 47	Stratford Oakum Co., Geo. 48
Cleveland & Buffalo Trans. Co. 44	Hyde Windlass Co. 3	National Cork Co. 47	Sturtevant, B. F. Co. 52
Cleveland City Forge & Iron Co. 51		Newport News Ship Building &	Sullivan, M. 43
Continental Iron Works 52	International Mercantile Marine	Dry Dock Co. 6	Sullivan & Co. 46
Cory, Chas. & Son. 52	Co. 45	New York & Cuba Mail S. S. Co. 45	Superior Ship Building Co. 4
Cowing, John P. 52	Ironville Coal and Dock Co. 43	New York Shipbuilding Co. 12	Sutton Co., C. E. 50
Craig Ship Building Co. *		Nicholson Ship Log Co. 44	
Cramp, Wm. & Sons, S. & E. B. 8	Jenkins Brothers. 52	Northwestern Steam Boiler &	Taylor Water-Tube Boiler Co. 41
Co. *	Jenkins, Russell & Eichelberg. 46	Mfg Co. 41	Thropp, J. E. & Sons Co. 41
Crandall & Son, H. I. 48-50		Otis Steel Co. 3	Tront, H. G. 44
Crane Co. 48-50	Kahnweiler's Sons, David 51		Truscott Boat Mfg Co. 7
	Katzenstein & Co., L. 51	Parker Bros. Co. 46	
Dearborn Drug & Chemical Wks. 9	Kidd, Joseph. 47	Parsons, Ralph M. †	United Fruit Co. 45
Delaware River Iron S. B. & E.	Kieley & Mueller. 2	Peck, Chas. E. & W. F. 45	Upson-Walton Co. 52
Works. 51	Kingsford Foundry & Machine	Penberthy Injector Co. 43	
Detroit Ship Building Co. 4	Works. 41	Pickands, Mather & Co. 43	Walker, Thomas & Son. 2
Dixon Crucible Co., Joseph. 44	Kremer, C. E. 46	Pittsburg Coal Co. 9	Ward Line. 45
Donnelly Salvage & Wrecking Co. 47		Potter, J. D. 47	Watson-Stillman Co. 51
Drein, Thos. & Son. 47	Lake Superior Contracting &	Power Specialty Co. *	White, Johnson, McCaslin &
Dunbar & Sullivan Dredging Co. 42	Dredging Co. 42	Prindville & Co. 46	Cannon. 46
	LeMol's Scientifique et Industrial *	Quintard Iron Works Co. 47	Wood, W. J. 47
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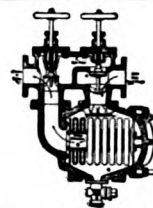
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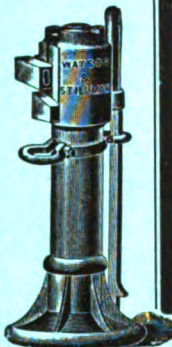
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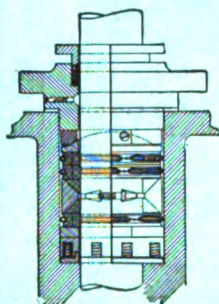
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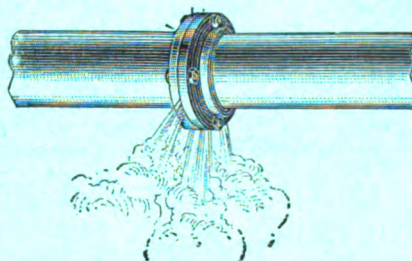
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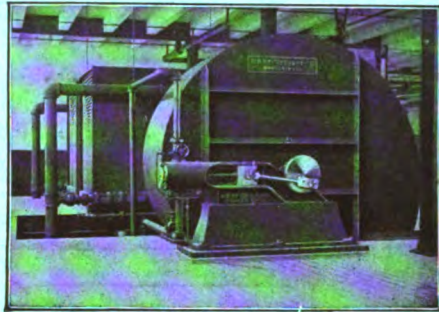
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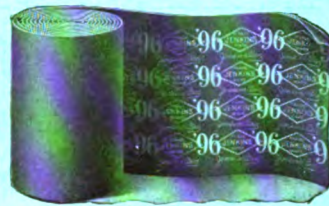
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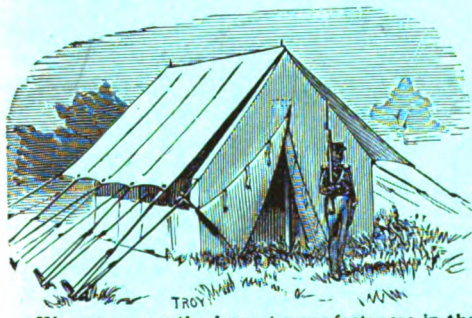
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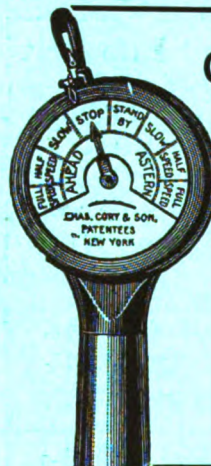
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